



PCI-SB StarFabric®
PCI Interface Card™
Installation Guide

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference in which case the user will be required to correct the interference at his own expense.

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About This Guide

About This Guide

This guide describes Aurora Technologies' PCI-SB StarFabric® PCI Interface Card (PCI-SB) for the purpose of installing and operating the card.

After reading this guide, you'll understand:

- The basic components and controls of the PCI-SB card.
- How to set DIP switches to control the operational behavior of the PCI-SB card.
- How to install the PCI-SB card in a typical environment.
- How to perform troubleshooting procedures for the PCI-SB card.

Audience

This document is intended for system integrators, system engineers, network engineers, or anyone responsible for installing and operating a PCI-SB card.

Navigating This Document

Table 1 shows you where to look for specific information on this product in this guide.




TABLE 1. How to Navigate This Document

If you want to learn about:	Read This Chapter...
The purpose or audience for this guide	Chapter 1, "About This Guide."
Introductory information on the PCI-SB card	Chapter 2, "About the PCI-SB StarFabric® PCI Interface Card."
Installing the PCI-SB card in your network	Chapter 3, "Installing the PCI-SB StarFabric® PCI Interface Card."
Troubleshooting information	Chapter 4, "Troubleshooting."
Warranty information on this product	Chapter 5, "Warranty & Maintenance Information."
Terminology used in this book	Glossary, "Terms and Definitions."
Cable and pinout information	Appendix A, "Cable & Port Requirements."
Hardware specifications	Appendix B, "Specifications."
The PVX Utility	Appendix C, "About the PVX Utility."

Documentation Conventions

Table 2 describes the symbolic conventions used in this guide.

TABLE 2. Conventions

Symbol	Description
screen display	Graphic text that appears on screens, menus and dialog boxes appears in sans serif font.
User input	User input values appear in boldface . These are characters or commands you type literally.
<i>emphasis</i>	Italics are used in the text for emphasis, titles, and variables.
	This caution symbol marks notes about possible damage to computer equipment or data if a procedure or process isn't followed according to instructions.
	This warning symbol marks notes about possible harm to yourself unless you follow special instructions.
	This symbol marks special text passages that contain additional information such as notes you should know about or tips you should consider when installing, operating, or maintaining this product.

Regulatory Information

The PCI-SB card meets the following regulatory requirements:

- FCC Class A
- EN55022
- EN55024

Related Documents

Refer to the following documents for more information about StarFabric technology or using the Aurora Technologies PCI-SB card in your environment.

- *PCI-SB StarFabric PCI Interface Card QuickStart™ Guide*
- *PCI-SB StarFabric PCI Interface Card Data Sheet*
at www.auroratech.com.
- *PCI 1.1 and 2.2 Bridge Specification(s)*
at www.pcisig.org.
- *StarGen StarFabric Protocol Reference Manual*
- *StarGen StarFabric Programmer's Manual*
at www.stargen.com.

Comments & Suggestions

For comments or feedback on this user guide, contact us at docs@auroratech.com.

About the PCI-SB StarFabric® PCI Interface Card

Introduction

This chapter describes the components, features, and functionality of the PCI-SB card, including:

- Basic components and functions of the PCI-SB card.
- Features and benefits of the PCI-SB card.
- Basic concepts of StarFabric Technology.
- Sample applications for the PCI-SB card.

About the PCI-SB Card

The PCI-SB card (see Figure 1) interconnects legacy PCI hardware with StarFabric-enabled devices to design highly-scalable and reliable, next-generation PCI expansion topologies based on StarFabric® technology.

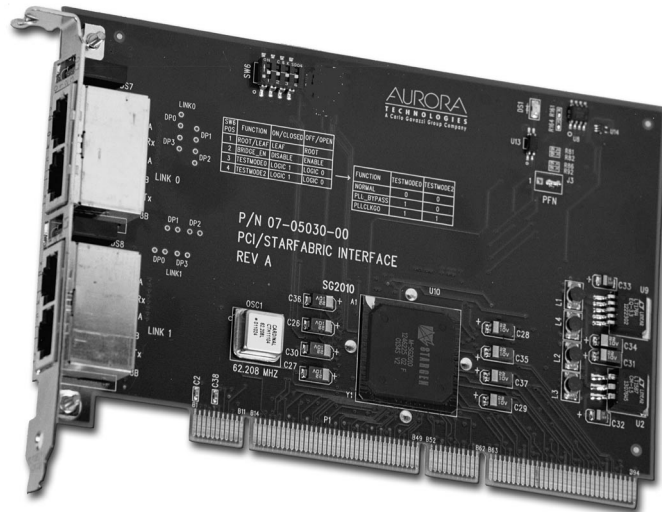


FIGURE 1. PCI-SB PCI Interface Card

The PCI-SB card installs into any standard PCI slot on a PCI 2.2 compliant motherboard to provide up to 220 expansion slots in a legacy PCI address routing application or Gateway path routing application.

Features & Benefits

The PCI-SB card provides the following features and benefits:

Scalability & Performance

- Dual 2.5 Gbps full-duplex StarFabric serial links with four RJ-45 connectors
- Supports 33/66 MHz PCI buses
- Supports up to 220 PCI expansion slots over a switch fabric
- Automatically detects 32-bit and 64-bit PCI slots

High Availability

- Link-by-link Cyclic Redundancy Checking
- Fault detection and isolation

Easy Support & Maintenance

- Standard CAT5 shielded cabling
- Standard RJ-45 interface jacks

Basic StarFabric Connectivity

The PCI-SB card provides the bridge functionality that enables your primary PCI bus to seamlessly, transparently and simply expand into a StarFabric network, as shown in Figure 2.

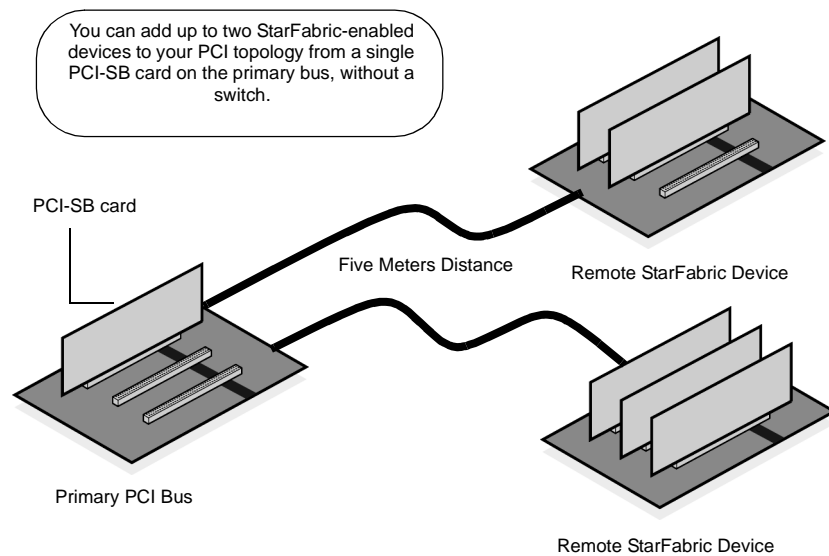


FIGURE 2. Using the PCI-SB Card to Add Two StarFabric-enabled Expansion Devices

This enables a host device with a PCI-SB card installed to connect to many different types of StarFabric-enabled devices such as Aurora's XP-SG Series PCI bus chassis or other StarFabric-enabled, application-specific devices such as card readers, cash registers, or item scanners.

All components on the remote StarFabric-enabled chassis appear as part of the primary bus when viewed from the host side of your PCI topology.

Remote StarFabric-enabled expansion units may require clocking and bus arbitration from an external source.

Complex Large Scale StarFabric Connectivity

By deploying a switch fabric within your PCI topology you can implement a total of 220 expansion slots from a single PCI-SB card configured as a Root bridge on the primary bus, as shown in Figure 3.

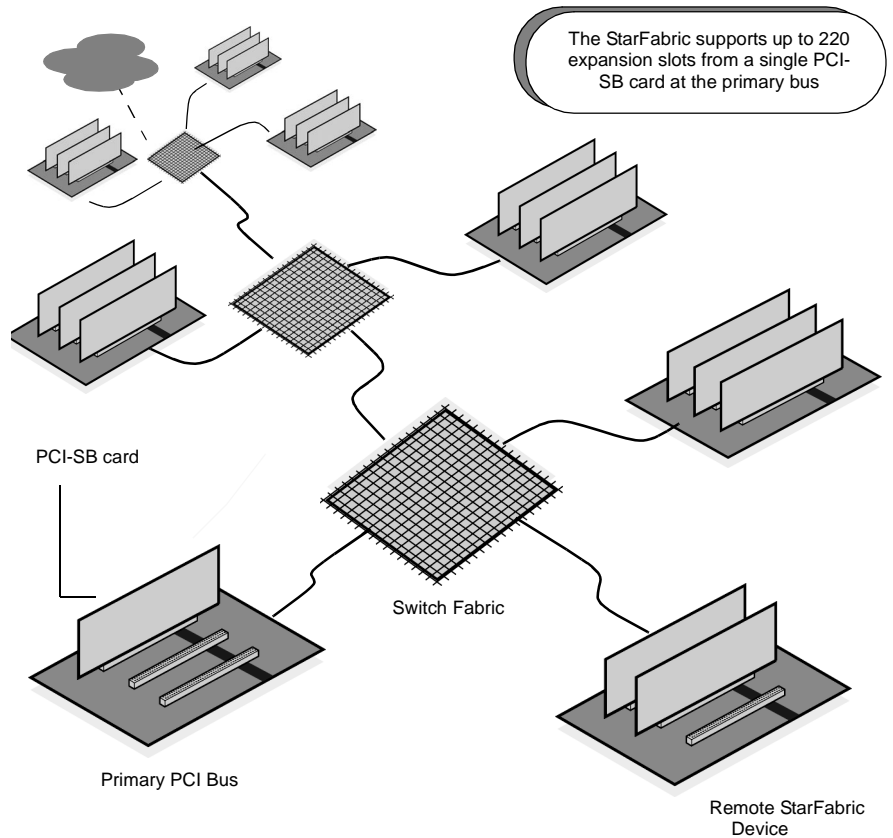


FIGURE 3. Using a Switch Fabric to Add StarFabric-enabled Devices

StarFabric switching also enables more sophisticated expansion topologies such as path routing with increased classes of service, redundant links, and automatic failover.

PCI-SB Card in Detail

The PCI-SB card is a PCI 2.2 short form factor card. It easily installs into any 32-bit or 64-bit PCI expansion slot on a PCI 2.2 compliant motherboard (see Figure 4).

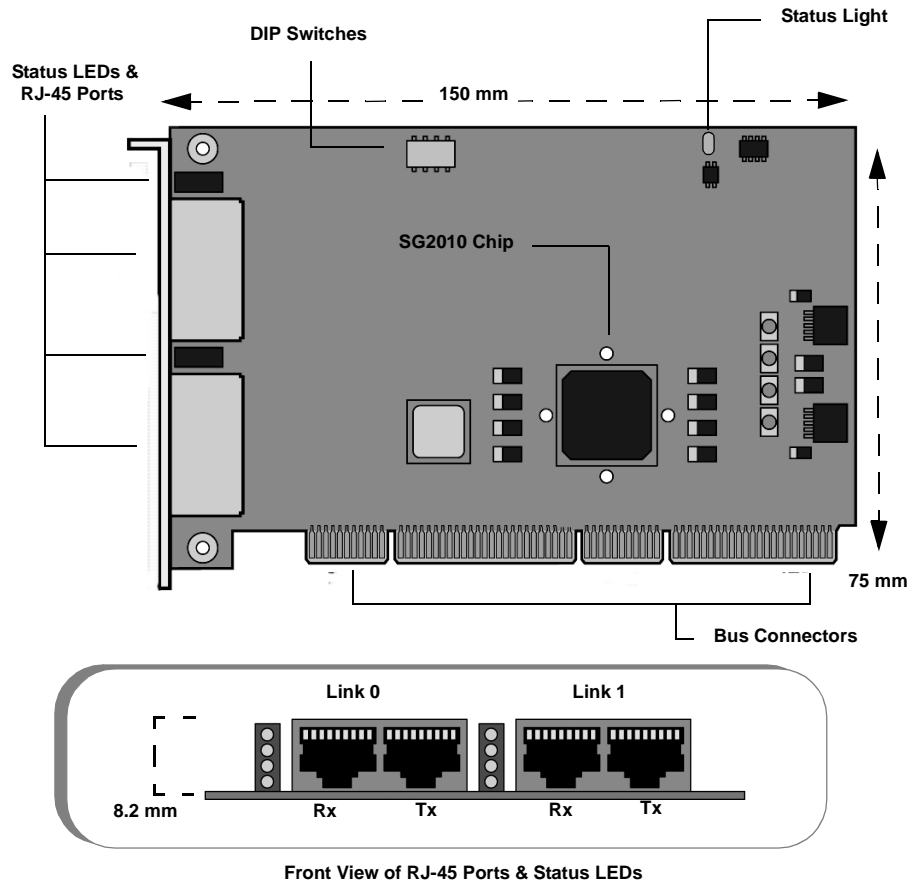


FIGURE 4. PCI-SB Card in Detail

PCI-SB Card Components

PCI-SB card components include:

- SG2010 PCI-to-StarFabric bridge chipset
- Two 2.5 Gbps StarFabric serial links with four RJ-45 jacks
- DIP switches to set operation and test modes
- Status LEDs to indicate port status
- Status Light to indicate card power-up

SG2010 Chipset

The StarGen SG2010 chipset functions at the core of the PCI-SB card to provide the bridge functionality and capability to convert PCI bus traffic into serial frame format StarFabric signals for transmission across the switch fabric or directly to remote StarFabric-enabled bridges.

Dual StarFabric Serial Links

Two pairs of RJ-45 connectors provide the interface for the dual 2.5 Gbps StarFabric serial links. You can aggregate the dual RJ-45 ports for full 5.0 Gbps speed using path routing for higher bandwidth. Or, you can provide redundant links between StarFabric-enabled devices to increase reliability. Path routing requires custom software development using the Fabric Primitives Library included on the CD-ROM shipped with your PCI-SB card.

Refer to “Networking StarFabric Devices” on page 2-17 for more details on inter-connecting StarFabric-enabled devices.

DIP Switches

DIP switches control the card’s operational modes. You use these switches to set the PCI-SB card for *Root* or *Leaf* operation as a bridge. See “PCI-SB Card Operating Modes” on page 2-11 for details on Root and Leaf modes.

Eight LEDs

Two rows of Green LEDs (four lights per row) show the operational status of the PCI-SB card’s ports based on the four pairs of Low Voltage Digital Signalling (LVDS) wires in each link. Each LED represents one LVDS pair on each link.

Table 3 shows the operational states for the PCI-SB card's LEDs.

TABLE 3. LEDs Operational States

If LED is:	This means...
On (Green)	LVDS pair is synchronized with traffic enabled
Flashing	LVDS pair is synchronized but traffic is disabled
Off	LVDS pair is not synchronized and traffic is disabled

Status Indicator Light

A Status Indicator light alerts you if the card malfunctions at power-up. When the PCI-SB card powers up, the status light should turn on briefly before shutting off. If the light remains on, there is a problem with the card.

Cabling

Standard CAT5 shielded cables support distances up to five meters (about 15 feet) for room scale topologies and eliminate the need for expensive proprietary cables.

Factory-Default Card Settings

The PCI-SB card is factory-ready to operate as a Root bridge in an address-routed legacy PCI application, or as a Root bridge in a path routed application.

This means the PCI-SB card is set to provide a bridge interface from the physical or primary PCI bus in your topology to remote secondary StarFabric-enabled devices, such as a PICMG expansion chassis or an XP-SG Series expansion chassis, as shown in Figure 5.

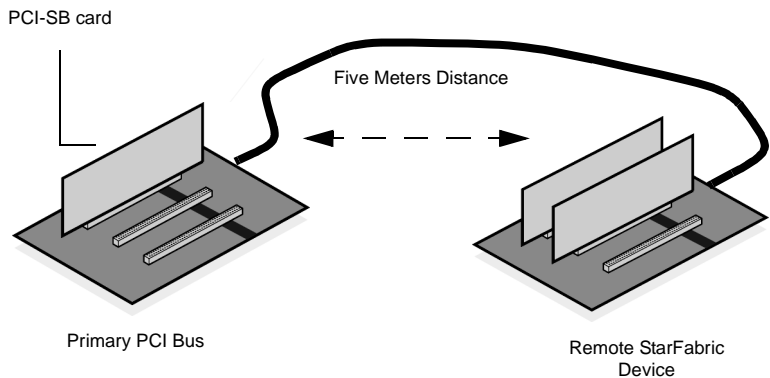


FIGURE 5. Factory Default Operating Mode for the PCI-SB Card

You can connect up to two StarFabric-enabled remote devices from a single Root bridge. The remote devices should be configured as Leaf bridges. Three or more remote devices require a StarFabric-enabled switch in the topology and custom software development using the Fabric Primitives Library (FPL).

You can also configure the PCI-SB as a gateway by disabling the bridge functionality and developing custom software. For more details on gateway functionality, refer to StarGen user manuals at www.StarGen.com.

See “PCI-SB Card Operating Modes” on page 2-11 for more details on the PCI-SB card’s operating modes.

For details on address routing traffic in legacy PCI bridge topologies or path routing, refer to “Networking StarFabric Devices” on page 2-17.

Windows, Linux, and Solaris x86 Support

The PCI-SB card is currently supported on Microsoft® Windows 98® and 2000®, Linux®, and Solaris® operating systems.

5.0v Expansion Card Support

The PCI-SB card supports only 5.0v or universal expansion cards in the chassis of StarFabric-enabled devices. Universal cards run at 5.0v in StarFabric-enabled devices.

PCI-SB Card Operating Modes

The PCI-SB card has three operating modes to meet the needs of your PCI topology:

- Root
- Leaf
- Gateway

Root Mode

Setting the card to Root mode means the PCI-SB card provides a Root bridge between the physical PCI bus and the StarFabric switch fabric or remote StarFabric-enabled devices, as shown in Figure 6.

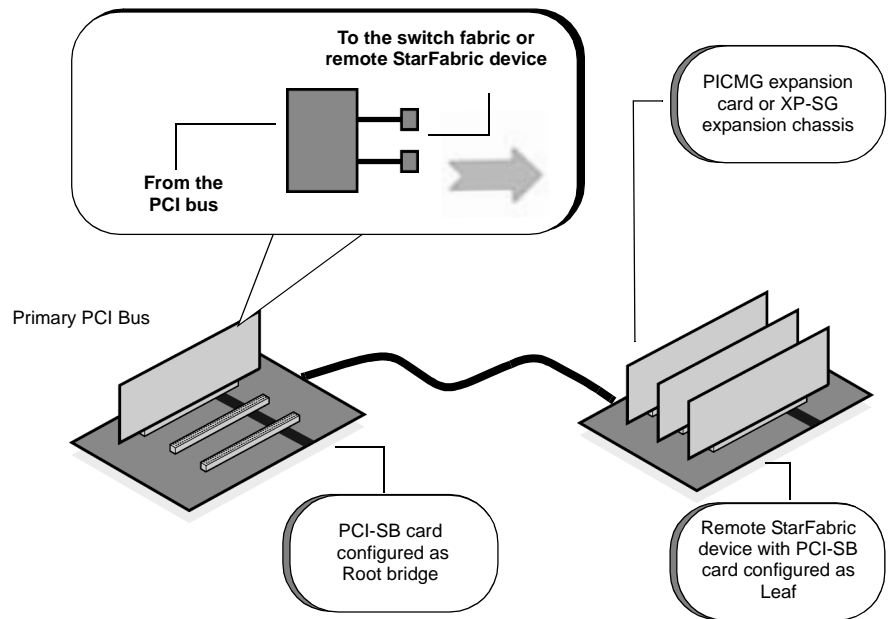


FIGURE 6. Root Mode Bridge

This mode of operation is used in legacy PCI bridge applications where traffic is address routed or routed based on a static address. The Root bridge is the upper-

most bridge in the expansion bus topology. It provides the interface from the primary bus to the switch fabric and all downstream or secondary StarFabric-enabled devices. The Root bridge initiates resets and enumerates (numerically identifies) all the downstream nodes configured as Leaf nodes in the switch fabric. See “Leaf Mode” on page 2-13 for details on Leaf operation.

Remote devices include an expansion chassis with a PICMG card interface or an XP-SG Series expansion chassis. Remote StarFabric-enabled devices may require clocking and bus arbitration from an external source.

Leaf Mode

Leaf means the PCI-SB card requires resetting and enumeration from a Root bridge in order to join and operate in the StarFabric network. All downstream nodes are set to Leaf. A PCI-SB card acting as a Leaf bridge connects the remote or secondary bus to a switch fabric or directly to a PCI-SB card configured as a Root bridge, as shown in Figure 7.

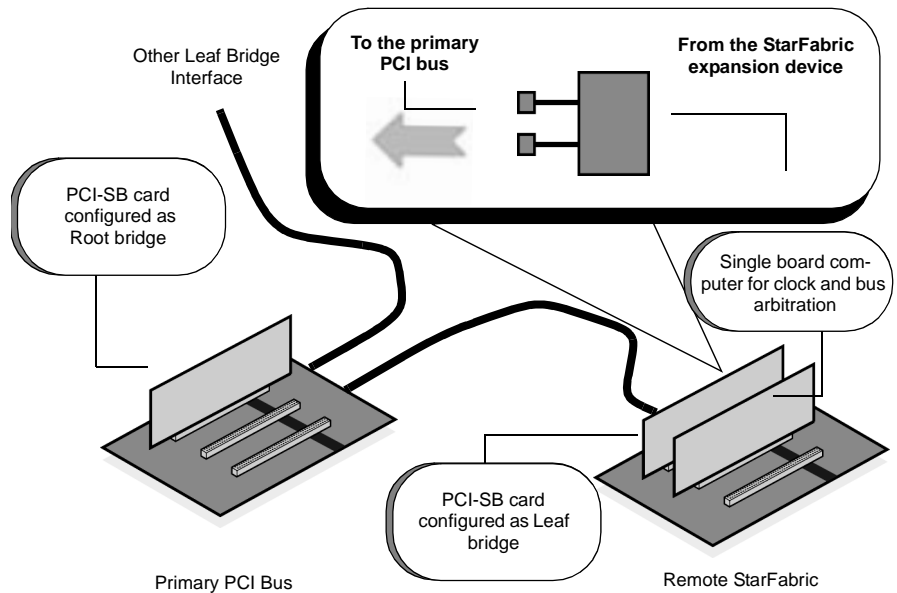


FIGURE 7. Operating as a Leaf Mode Bridge in Path Routing Application

All Leaf nodes in an address-routed legacy PCI application are configured as bridges and may require clocking and bus arbitration from an external source. The Leaf expansion bridges are fully transparent and all PCI components on the secondary buses are fully visible to the primary bus.

Gateway

Gateway is the recommended operating mode for all Leaf nodes in a path routing application. In a path routing application, one PCI-SB card is configured as the Root bridge to provide resets and enumeration for all the downstream nodes, as shown in Figure 8.

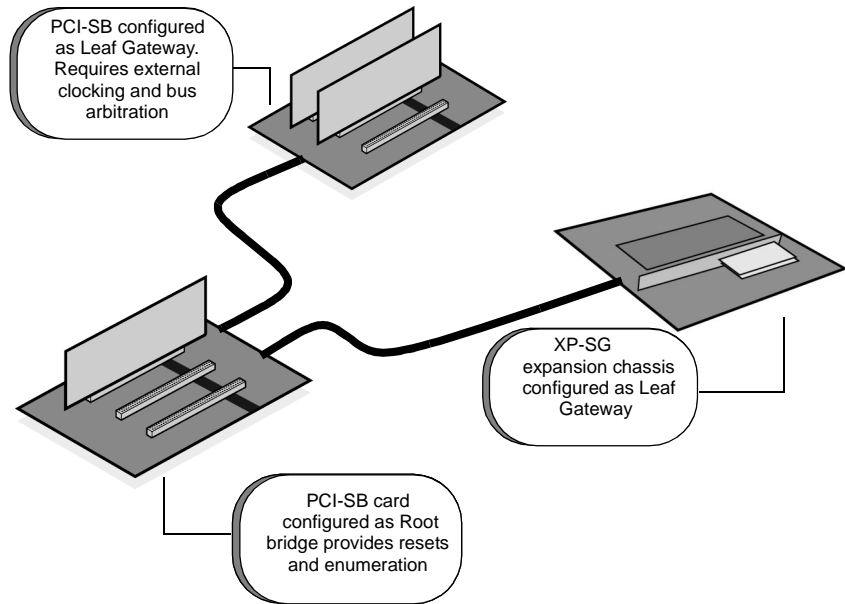


FIGURE 8. Leaf Gateways Connecting Remote PCI Buses to StarFabric

All downstream nodes should be configured as Leaf Gateway nodes to connect the remote PCI expansion buses to the StarFabric or other StarFabric-enabled devices.

CUSTOM SOFTWARE DEVELOPMENT

You must develop custom software to operate the PCI-SB card as a Leaf Gateway in a path routing application. Use StarGen's Fabric Primitives Library (FPL) to create the required software. A copy of the FPL is included on the CD-ROM that shipped with your PCI-SB card.

EXTERNAL CLOCKING & BUS ARBITRATION

A PCI-SB card operating as a Leaf requires clocking and bus arbitration from an external source. Typically, you use a single board computer or a bus mastering device installed in a PCI slot on the remote device to provide clocking and bus arbitration.

How StarFabric Technology Works

StarGen's StarFabric® is an open switched interconnect technology that lets you design next generation voice, data, and video communications networks to expand the capabilities and flexibility of your existing PCI topology, as shown in Figure 9.

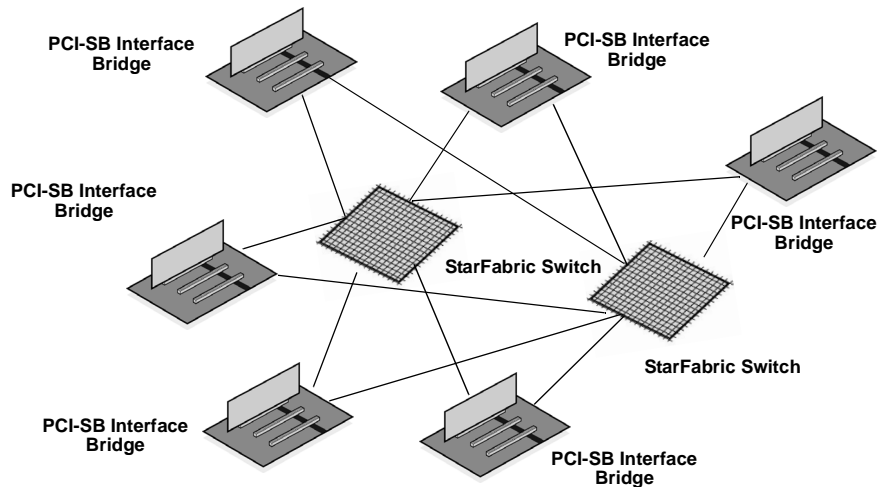


FIGURE 9. A Conceptual View of StarFabric Technology

Using a StarFabric-based communications product such as the PCI-SB card, your PCI topologies can seamlessly integrate next-generation bridge and gateway solutions and migrate to advanced routing solutions and increased classes of service.

With the PCI-SB Interface and StarFabric switch technology, you can design simple expansion solutions to connect to one or two chassis, or large, complex redundant switch fabrics for high availability and increased bandwidth, as shown in “Sample Applications” on page 2-21.

Networking StarFabric Devices

StarFabric-enabled devices can be interconnected in different ways to improve the scalability and reliability of your PCI topology. Interconnecting these devices is like weaving a fabric of related links, devices, and components throughout your PCI topology.

The StarFabric-enabled device components such as the PCI-SB cards lie within the fabric, as shown in Figure 10. The legacy PCI buses and PCI devices reside outside the fabric, using the PCI-SB cards as interfaces to the fabric.

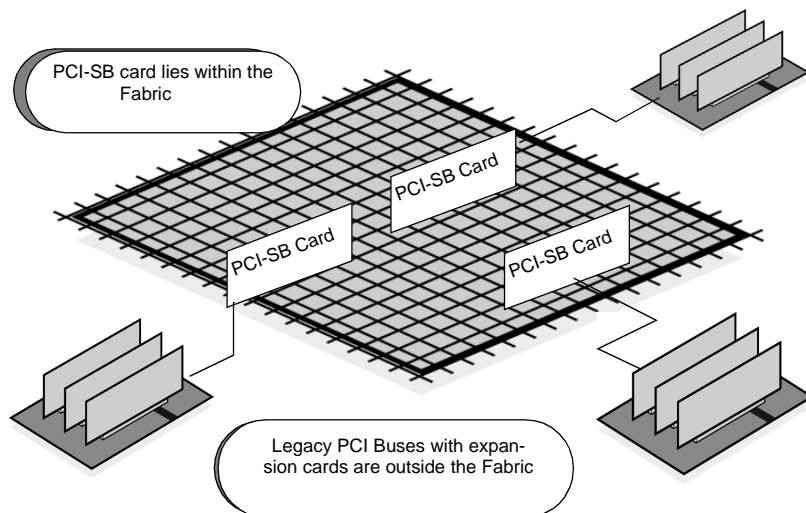


FIGURE 10. StarFabric PCI Bus Topology

The PCI-SB card handles the entire interface with the switch fabric, so the legacy PCI buses and expansion chassis are unaware they are even part of the fabric.

Address Routing and Path Routing

There are two ways to interconnect StarFabric-enabled devices:

- Address Routing
- Path Routing

Address Routing Application

Address routing is the PCI-to-PCI bridge method similar to a typical legacy PCI environment. This is the mode the PCI-SB card operates in by default. All the StarFabric-enabled devices in the fabric appear as standard PCI bridges with a numeric fabric identification (FID) number, creating a standard PCI bridge topology without switching behavior or redundant, bundled links to other PCI bridges or expansion devices.

This application provides a simple, cost-effective migration from a hierarchical legacy PCI topology to the next-generation StarFabric solution that can be used out of the box without developing custom software.

At power-up, all the StarFabric-enabled devices are discovered and identified by FID, and the fabric remains static despite physical changes in the topology. If a link to a device goes down or a device becomes disabled, the device is unavailable to the fabric and there is no automatic or dynamic reconfiguration of the PCI bridge topology, as shown in Figure 11.

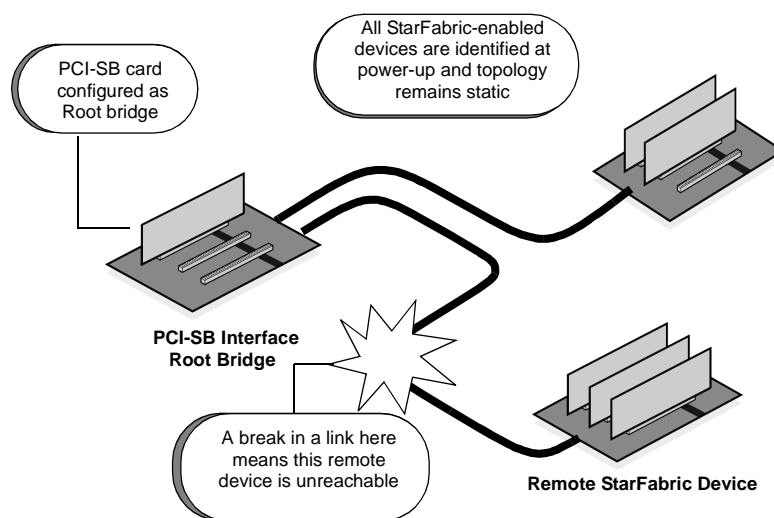


FIGURE 11. Address Routing for Legacy PCI Mode

In address routed or legacy PCI mode, StarFabric-enabled devices behave as normal legacy PCI bridges because they are unaware that they are part of a fabric.

Path Routing Application

Path Routing provides a more flexible and reliable PCI bus topology because it doesn't rely on one path to connect two devices.

Path routing lets you define class of service, bandwidth allocation, and best paths to connect a source device to a target device in the PCI topology. It lets you allocate resources by statistically defining connections between devices based on amount of traffic and device availability.

This means you can dynamically route traffic through the PCI topology on request or based on bandwidth requirements or the availability of a particular device, as shown in Figure 12.

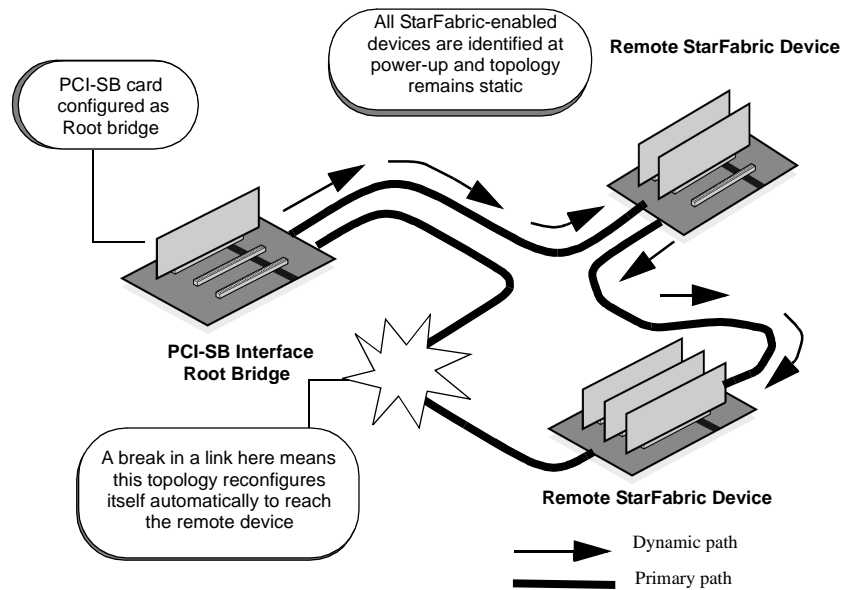


FIGURE 12. Path Routing for Dynamic PCI Topology

At power-up, all StarFabric-enabled devices are discovered and identified by FID. Routing tables residing in the edge nodes (PCI-SB cards) keep track of best paths to destinations in the topology. The number of nodes between a source device and a target device are referred to as *turns*. Based on the routing table in the source device, the path with fewest turns is used to reach a target device when changes occur in the topology or the best path is used.

As shown in Figure 12, when the link to a remote device goes down, the Root bridge can still reach the remote device by reconfiguring the path dynamically using path routing functionality.

Refer to the *StarGen Fabric Programmer's Guide* for more details on using the PCI-SB card's advanced routing functionality.

Sample Applications

Figure 13, Figure 14, and Figure 15 demonstrate how you can deploy a PCI-SB card in your environment.

Legacy PCI Bridge Expansion

Figure 13 shows a typical legacy PCI application where a PCI-SB card connects a primary PCI bus to an Aurora Technologies XP-SG expansion chassis to provide access to additional PCI slots in the remote StarFabric-enabled device.

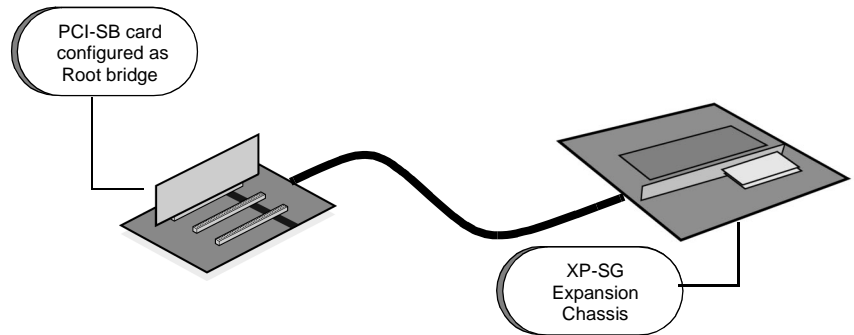


FIGURE 13. PCI-SB Interface to Remote StarFabric-enabled Devices

High Reliability and PCI Expansion

Figure 14 shows another PCI Legacy application where a single PCI-SB bridge connects two remote StarFabric-enabled devices to increase the number and availability of a topology's expansion slots or remote StarFabric devices by building redundant links between the primary PCI bus and remote devices.

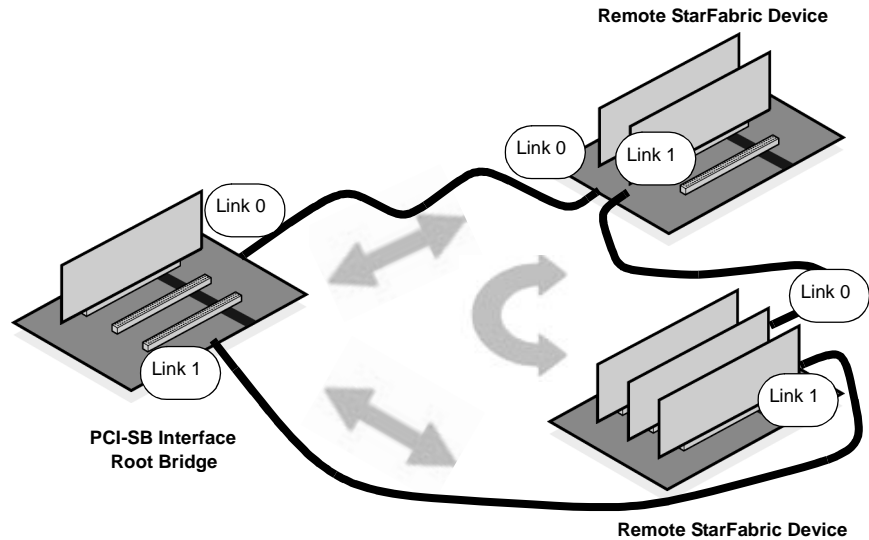


FIGURE 14. PCI Host Bridge to Leaf Bridges for High Reliability

High Availability and Scalability Switching

Figure 15 shows how to add StarFabric switch functionality to your expansion bus topology to greatly increase the number of expansion slots in your environment while adding high availability and improved reliability.

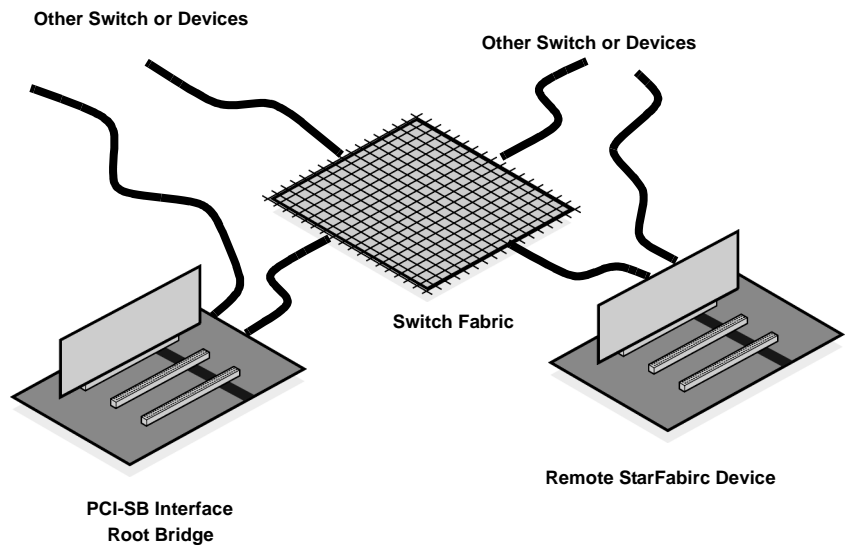


FIGURE 15. PCI-SB Card to Switching Fabric

Installing the PCI-SB StarFabric® PCI Interface Card

Introduction

This chapter describes how to install the PCI-SB card in a device, including:

- Setting DIP switches to control the operational behavior of the PCI-SB card.
- Installing the PCI-SB card in the PCI slot of a device.
- Reading LEDs to obtain the operational status of the PCI-SB card.

Before You Begin...

This section describes steps you should take before you install the PCI-SB card.

Check the Shipping Contents...

Check the contents of your shipment against the contents shown in Figure 16 to make sure you have everything you need to install the PCI-SB card.

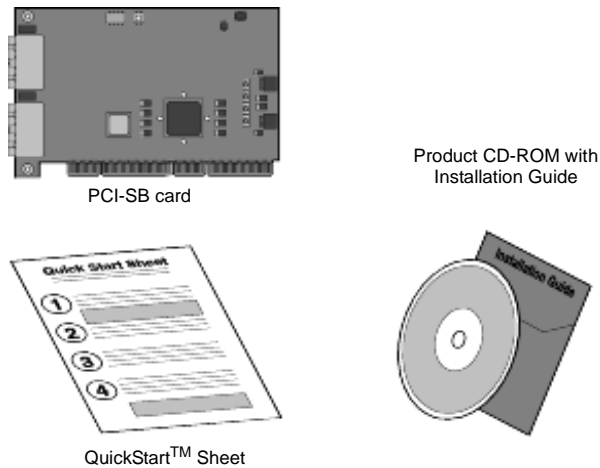


FIGURE 16. PCI-SB Card Shipping Contents

Your shipment includes:

- One PCI-SB card
- One product CD-ROM
- One QuickStart sheet

If anything is missing from your shipment, contact Aurora Technologies at (508) 588-6110 or support@auroratech.com.

Discharge Static Electricity



Wear an anti-static wrist strap fastened to a suitable ground point at all times when handling the PCI-SB card, as shown in Figure 17.

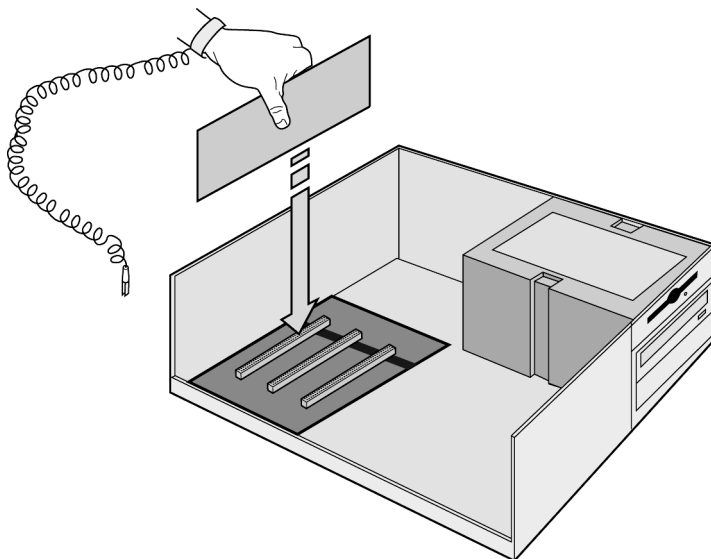


FIGURE 17. Use an Anti-Static Wrist Strap During Installation

The strap protects the card from damage and prevents you from damaging the computer motherboard or other components during the installation process.

Inspect the PCI-SB card

Your PCI-SB card is configured for Root Bridge operation by default at the factory. If Root Bridge is the desired operation mode, just visually inspect the card to make sure it is configured as shown in Figure 18.

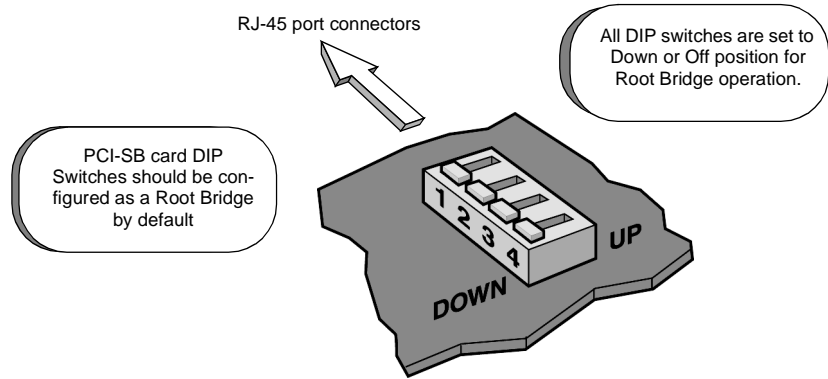


FIGURE 18. Factory-Default DIP Switch Settings

Steps to Install the PCI-SB Card

Complete the following procedures to install the PCI-SB card in a PCI slot in a device.

1. Configure PCI-SB Card DIP switches for Root or Leaf operation.
2. Shut down the local device and remote devices.
3. Insert the card in a PCI slot in a device.
4. Connect the CAT5 shielded cabling.
5. Perform power-up sequence for remote devices and local device.
6. Install hardware drivers.
7. Verify operation and connectivity.

Refer to the following sections for step-by-step details on these procedures.

Step 1 - Configuring the Card for Root or Leaf Operation

Set the DIP switches on the PCI-SB card for Root or Leaf mode operation, as shown in Figure 19.

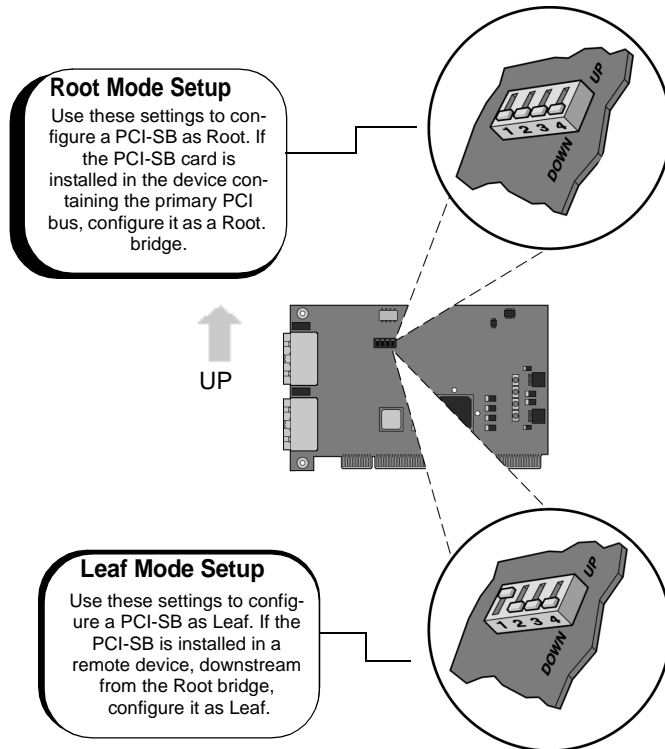


FIGURE 19. Setting the DIP Switches for Operating Modes

Set the PCI-SB card to Root bridge if it is installed in the device containing the primary PCI bus.

Set the PCI-SB card to Leaf if it is installed in a remote device containing the secondary PCI bus or expansion bus.

Table 4 shows the configurable settings for DIP switches on the PCI-SB card.

TABLE 4. DIP Switch Settings

Slot Number	Down/Off	Up/On
1	Set to Root mode	Set to Leaf mode
2	Enables Bridge	Disables Bridge
3	*Test mode	*Test mode
4	*Test mode	*Test mode

* For factory-use only by Aurora Technologies personnel.



To use the PCI-SB card as a Gateway, set the DIP switches to Disable Bridge. Gateway functionality requires additional software development using StarGen's Fabric Primitives Library. Refer to StarGen user documentation for more details.

Step 2 - Shutting Down the Local and Remote Devices

Follow these steps to power down the local and remote devices before installing the card:

1. Shut down the local and remote device(s) according to their recommended shut-down procedures.

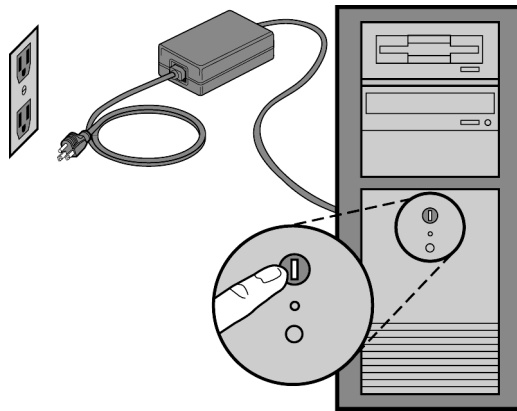


FIGURE 20. Shutting Down Local and Remote Devices

2. Remove power cords from wall outlets.

Step 3 - Installing the PCI-SB Card

Follow these steps to insert the PCI-SB card in a PCI slot in the local device.

1. Remove the cover from the device enclosure to expose the connector panel for the PCI slots. Refer to your device system's hardware manual for details on removing the cover.
2. Find an available and easily accessible PCI slot and remove the cover plate from the back of the device to create an opening for the PCI-SB card's RJ-45 connectors. Place the screw aside for later use.
3. Align the PCI-SB card's connector with the 32-bit or 64-bit expansion slot and press the card into the slot gently and evenly as shown in Figure 21.

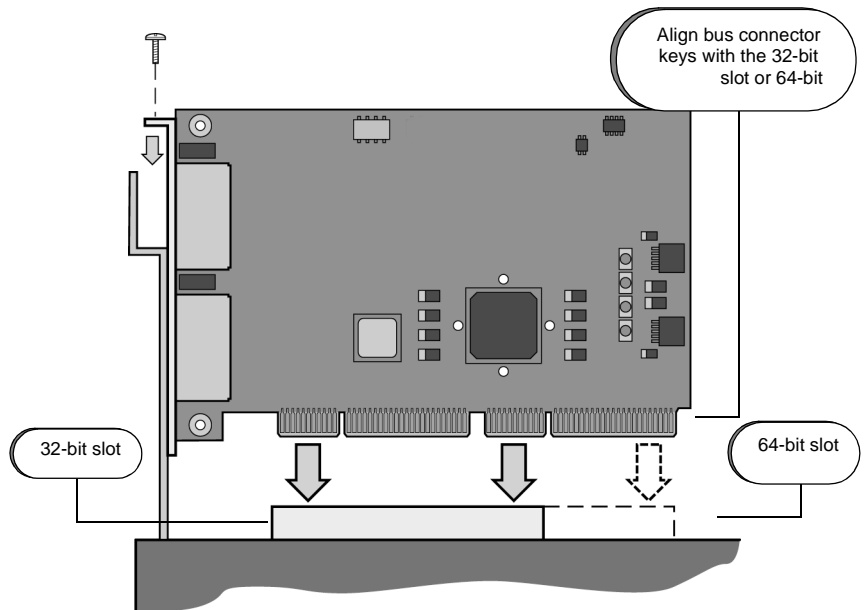


FIGURE 21. Installing PCI-SB Card in 32-bit or 64-bit Slots



The motherboard should be PCI 2.2 compliant to install the PCI-SB card. The bus connectors on some PCI 2.1 or earlier 32-bit boards may not

accommodate newer expansion cards.

4. Make sure the card's bus connector is pressed in until no gold is visible and the card is seated firmly in the expansion slot, as shown in Figure 22 and Figure 23. Then, secure the card in place by fastening a single screw to the fastener bracket while holding the card in place.

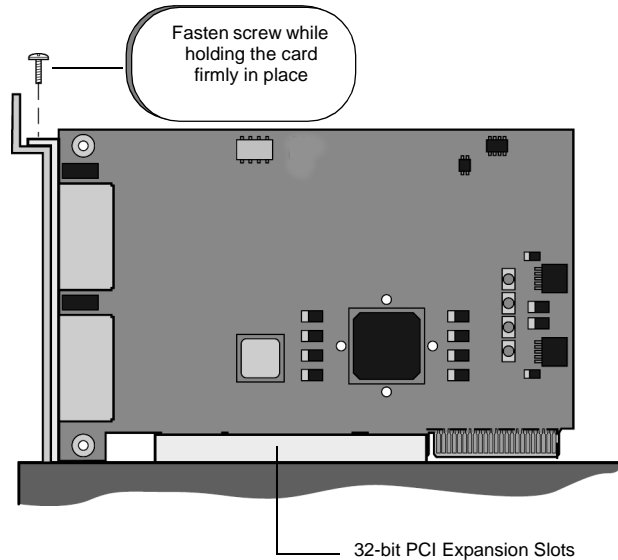


FIGURE 22. Securing the PCI-SB Card in 32-bit Slot



Sometimes the PCI-SB card becomes unseated when you fasten the screw tightly. You may need to hold the card in place as you fasten the screw. Then, make sure all the gold connectors are firmly inserted inside the expansion slot. Chassis tolerance may vary, so you may need to adjust the PCI-SB bracket to obtain the best fit.

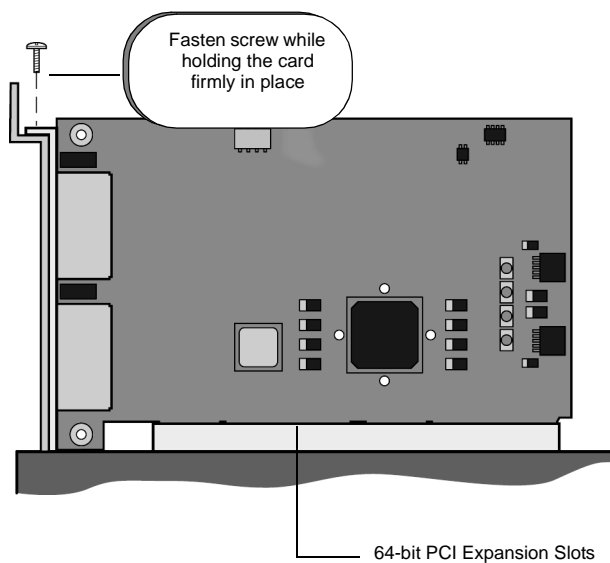


FIGURE 23. Securing the PCI-SB Card in 64-bit Slot

5. Replace the device's cover.

Step 4 - Connecting the Cables

Follow these steps to connect shielded straight-thru cables:

1. Connect the Transmit (Tx) port on the local device to the Receive (Rx) port on the remote device, as shown in Figure 24.
2. Connect the Receive (Rx) port on the local device to the Transmit (Tx) port on the remote device.

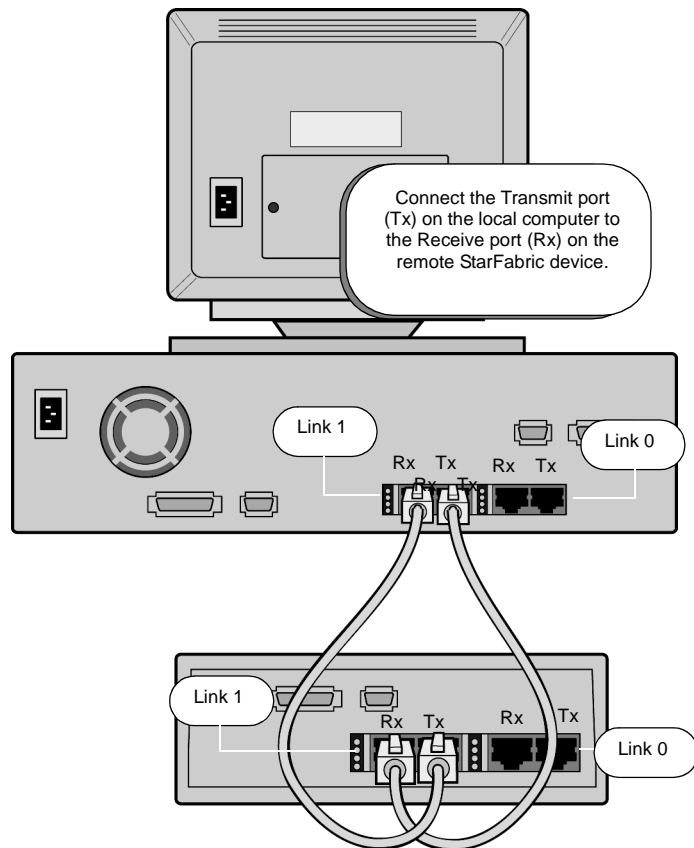


FIGURE 24. Connecting CAT5 Cables for 2.5 Gbps Links

3. Repeat steps 1 and 2 on the other link to bundle links for full 5.0 Gbps high bandwidth links or to daisy chain cards to another remote PCI bridge, as shown

in Figure 25 on page 13 and Figure 26 on page 14.

By connecting two serial links to a remote chassis, you can provide high availability, enhanced reliability, and higher bandwidth for your StarFabric topology, as shown in Figure 25.

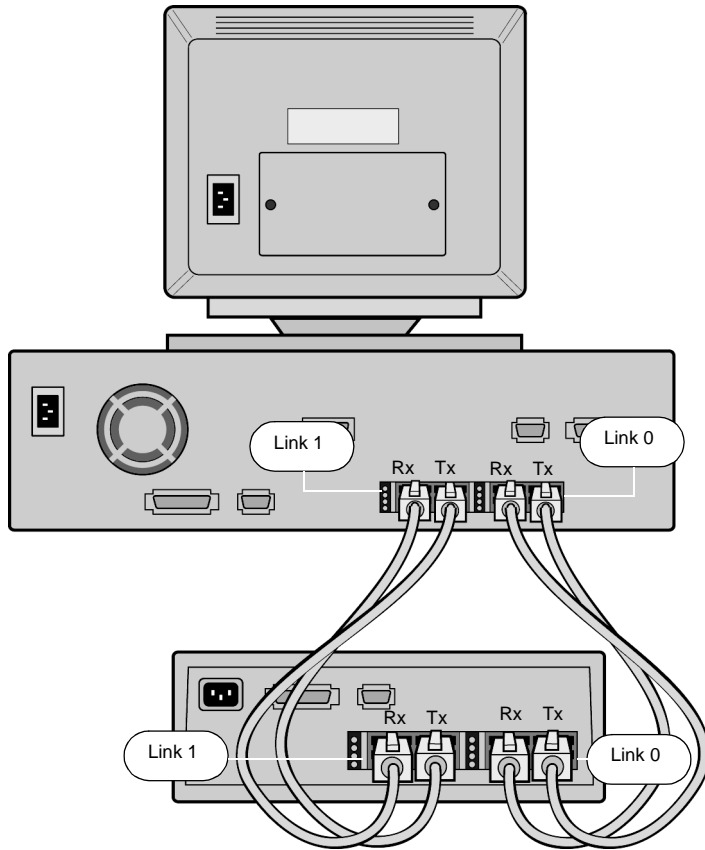


FIGURE 25. Aggregating Dual Serial Links to Remote Chassis



The link bundling application shown in Figure 25 requires path routing software. You develop custom software for path routing functionality in a

StarFabric topology. Refer to StarGen user documentation for details on path routing functionality and programming.

Figure 26 shows how to daisy-chain a Root bridge device with two StarFabric-enabled Leaf bridge devices for redundancy and high availability of remote systems.

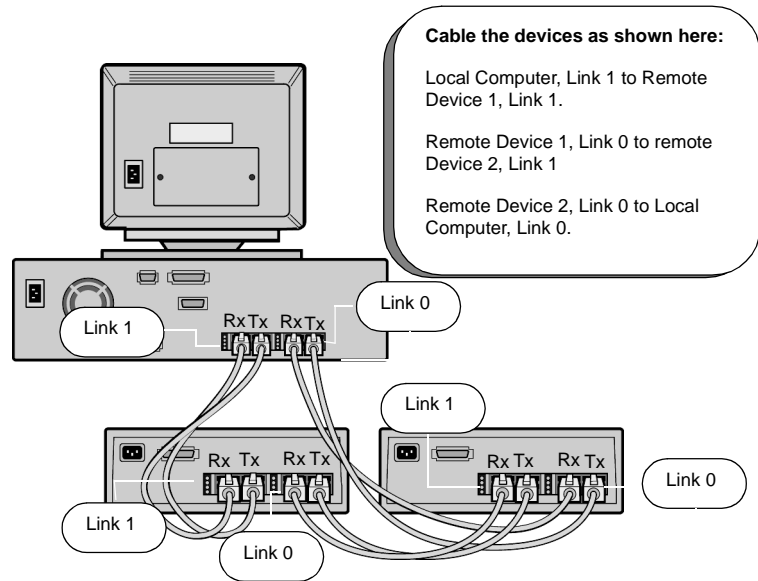


FIGURE 26. Daisy-Chaining StarFabric Devices

Step 5 - Powering Up the Local and Remote Devices

Follow these steps to correctly power-up the devices:

1. Power-up the remote device first, as shown in Figure 27. The PCI-SB card in the local device must synchronize with the remote interface card at power-up, so power-up the remote device before powering up the local device.

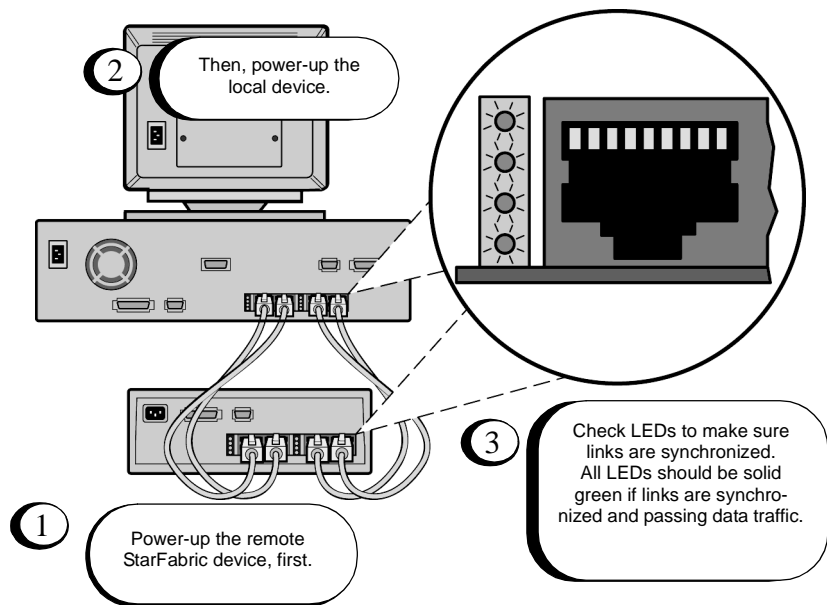


FIGURE 27. Powering Up the Devices

2. Power-up the local device. If the serial ports are synchronized, LEDs for the ports in use turn solid green and remain on. If the LEDs are flashing, this means links are synchronized, but cannot pass traffic. If this happens, refer to Chapter 4, "Troubleshooting."

Step 6 - Installing Hardware Drivers

For the Linux or Solaris x86 OS: No driver installation is required. Proceed to Step 7, on page 3-21 to complete the installation.

For Microsoft Windows OS: After powering up the local device, Windows automatically detects the PCI-SB card installed in your device and runs a wizard to help you install a device driver for the new hardware.

Follow these steps to select a driver:

Step 1. Insert the CD-ROM that shipped with your PCI-SB card in the CD-ROM driver of the computer and click **Next** as shown in Figure 28.

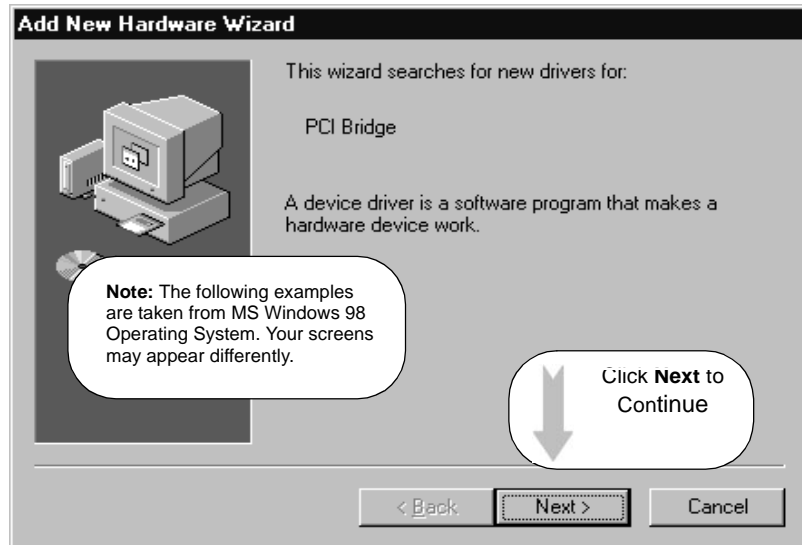


FIGURE 28. Select Next to Install New Hardware



FIGURE 29. Select Next to Search for Driver

Step 2. Select **Search for a better driver...** and click **Next** to continue with the driver installation as shown in Figure 29.

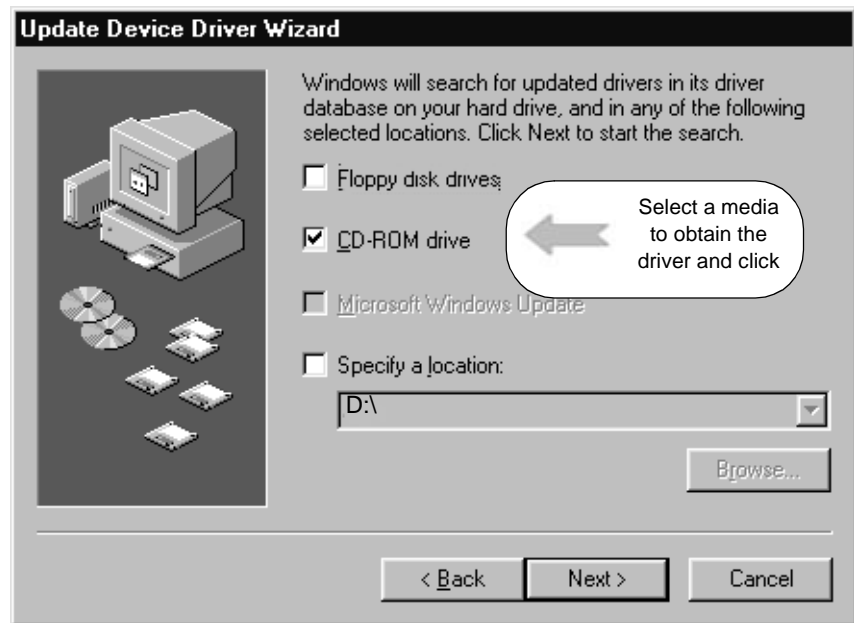


FIGURE 30. Select Standard Bridge Driver and Click Next

Step 3. Select a location to search for the driver, as shown in Figure 30.

For Windows 98, select **CD-ROM** to search for the PCI-SB driver on the CD-ROM that shipped with your card.

For Windows 2000, select **Specify a location:** and provide the following path to the driver: **AURAsfb/Win2k/aurasfb2k.inf**.



The Windows 98 and 2000 drivers are included on the CD-ROM that shipped with your card.

The Windows 98 driver is located on the CD-ROM at **AURAsfb/Win9x/aurasfb9x.inf**

The Windows 2000 is located on the CD-ROM at **AURAsfb/Win2k/aurasfb2k.inf**.

Step 4. Windows searches for the driver in the selected location. Once it finds the location of the driver, click **Next** as shown in Figure 31.

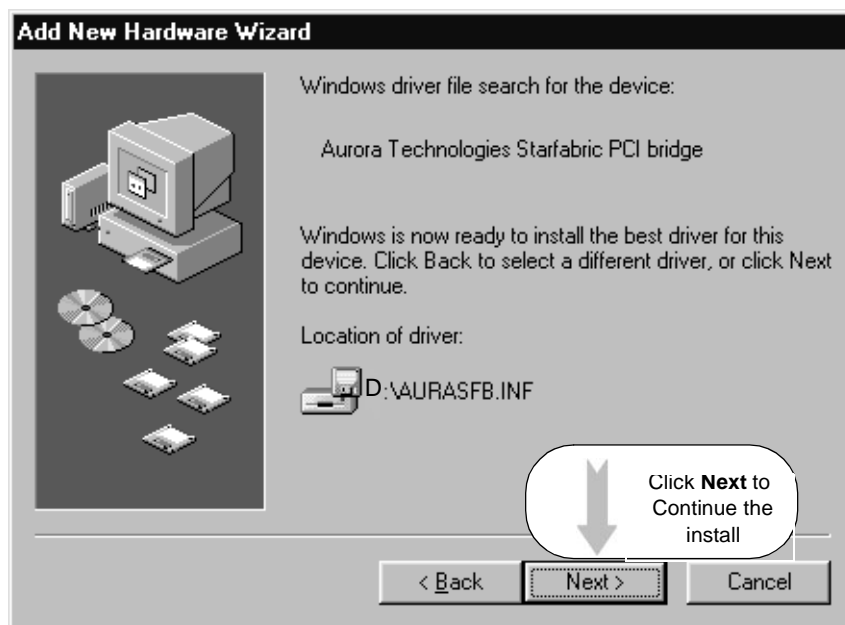


FIGURE 31. Searching for the Hardware Driver



FIGURE 32. Complete the Driver Installation

5. After Windows installs the driver, click **Finish** to complete the installation.
6. Proceed to Step 7, on page 3-21 and verify that there is connectivity between the devices by viewing local components and remote components in the expansion bus.

Step 7 - Verifying Link Connectivity

As a final check, you can view the actual components that make up the connection to ensure there is connectivity.

Follow these steps to verify connectivity between the local and remote devices.

For Linux...

1. Type in **lspci** at the system prompt. The text string in Figure 33 appears.

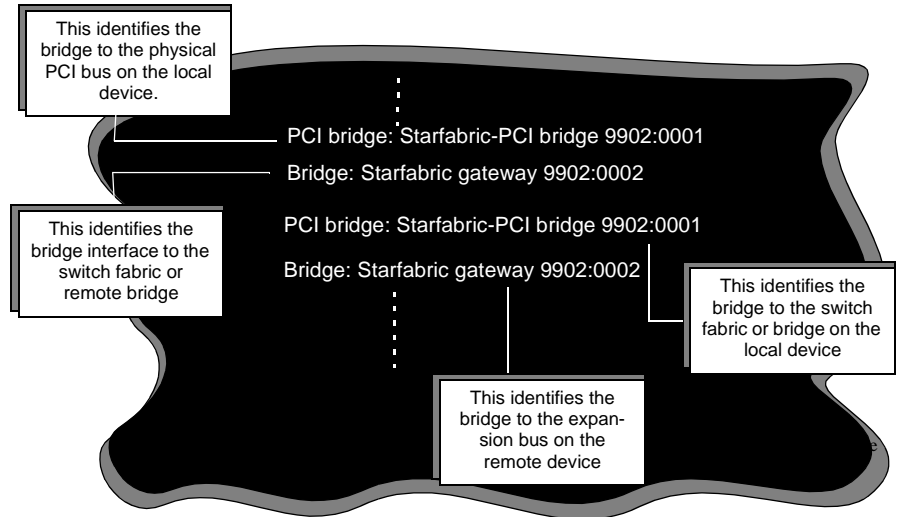
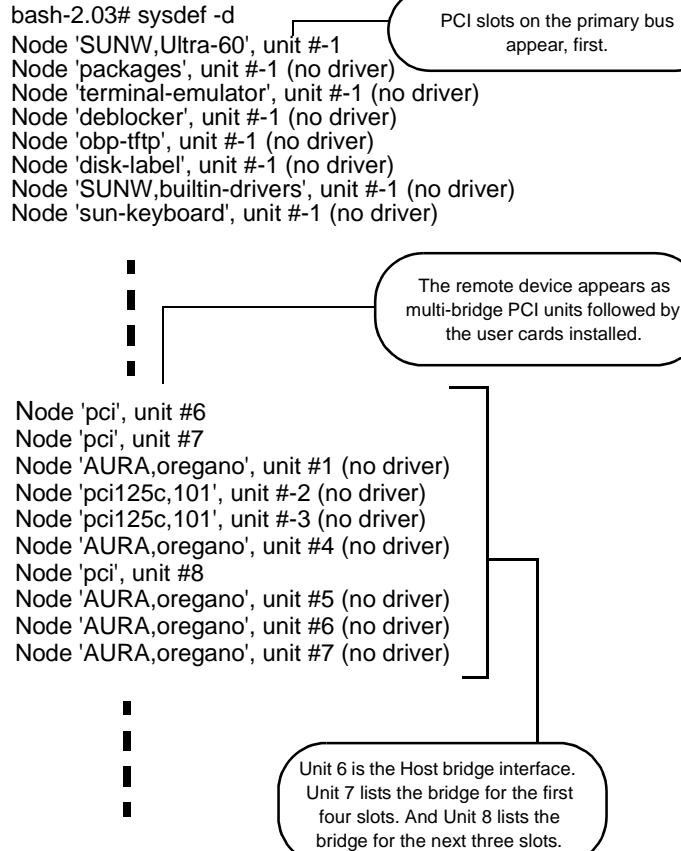


FIGURE 33. Steps to Verify Links

2. Check the display for the PCI-SB card and expansion cards you installed, as shown in Figure 33. The local bridge components and the remote bridge components should appear in the list.

For Solaris x86...

1. Type **sysdef -d** at the (shell) system prompt, as shown in Figure 34.

**FIGURE 34. Checking Connectivity for Solaris x86**

For Windows...

1. From the Start menu, select **Settings -> Control Panel -> System** or right-click on the **My Computer** icon and select **Properties**.
2. Click on the **Device Manager** tab.
3. Select **View by Connection** to display a list of components configured on your system.

A list of devices appears, as shown in Figure 35.

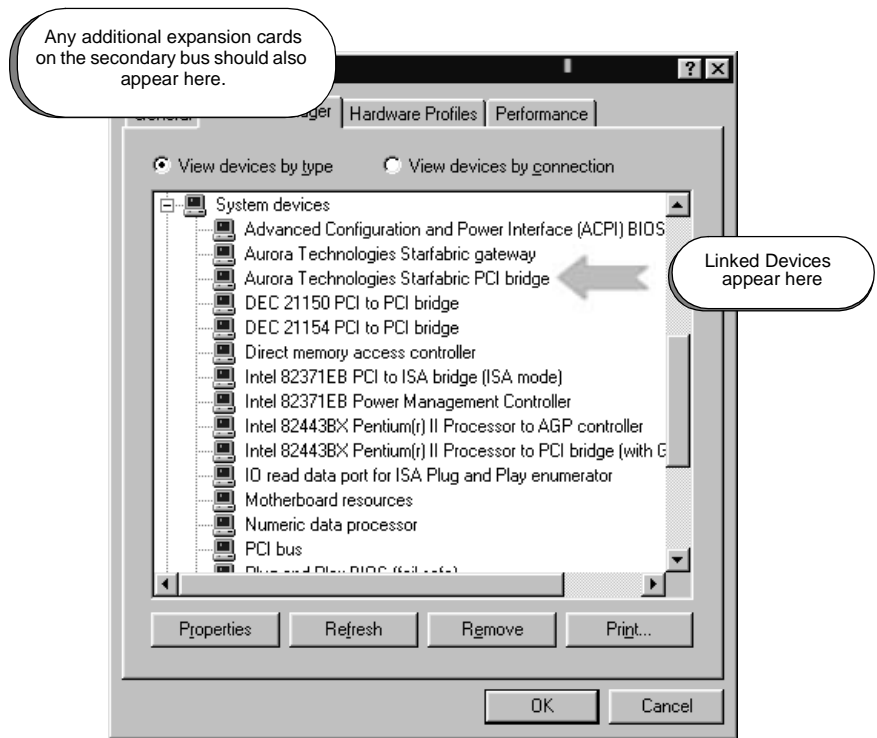


FIGURE 35. Device Manager List of PCI Host Interface Links

4. Check the list for the PCI-SB card and expansion cards.
If you don't see your PCI-SB card in the list, refer to Chapter 4, "Troubleshooting."

Troubleshooting

Introduction

This chapter provides troubleshooting information for problems you may encounter while installing or operating the PCI-SB card, including:

- Determining the operational status of your PCI-SB card.
- Performing troubleshooting procedures to support your PCI-SB card.

Determining Operating Status

The LEDs and Status Indicator Light on the PCI-SB card help you determine the operational status of your card.

Follow the steps in Figure 36 and Figure 37 to determine the operational status of your PCI-SB card.

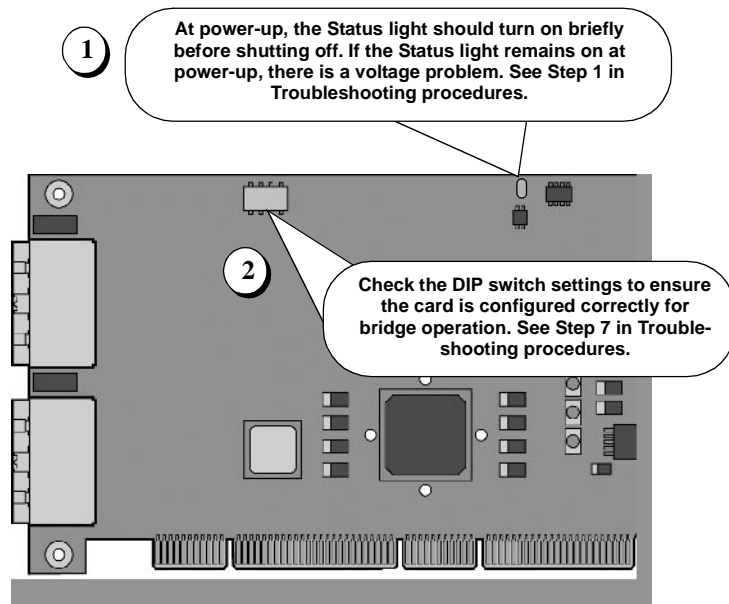


FIGURE 36. Determining Operational Status of PCI-SB Card

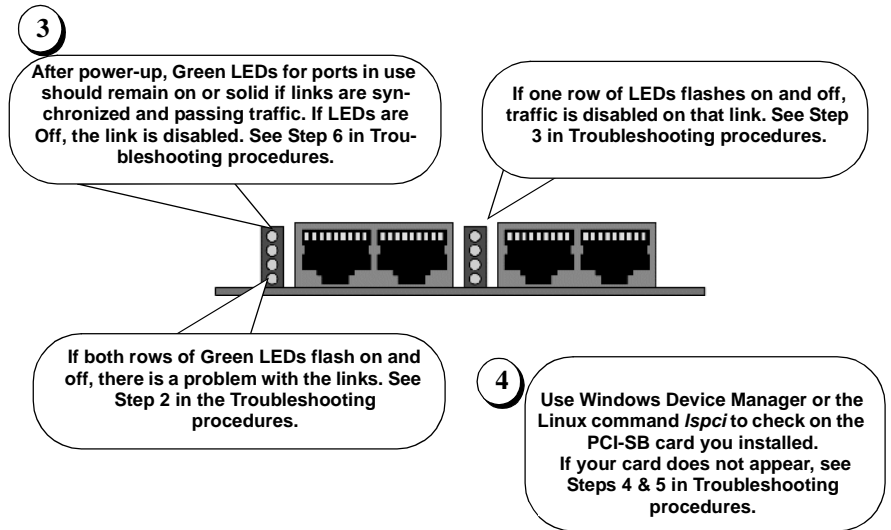


FIGURE 37. Determining Normal Operating Status by Viewing LEDs

If you encounter any of these error conditions, follow the troubleshooting procedures in “Troubleshooting the PCI-SB Card” on page 4-4.

Troubleshooting the PCI-SB Card

This section shows you how to resolve problems you encounter while installing or operating your PCI-SB card.

Troubleshooting Procedures

Table 5 describes problems to look for and procedures to follow when you are troubleshooting your PCI-SB card.

TABLE 5. Troubleshooting Procedures

Step	If this happens...	Do this:
1	The card's status light remains on or solid after power-up.	<p>The motherboard cannot supply 3.3v power to the PCI-SB card.</p> <ul style="list-style-type: none"> • Make sure the motherboard is capable of providing 3.3 volts to the PCI-SB card. Older systems may not supply 3.3v of power to expansion slots. • Make sure the card is fully seated in the expansion slot. • Restart the local host device.
2	Both rows of Green LEDs are flashing.	<p>Both serial links are synchronized, but unable to transmit or receive data.</p> <ul style="list-style-type: none"> • Make sure the card is fully seated in the expansion slot. • Make sure the cable's RJ-45 plugs are fully inserted in the RJ-45 jacks. • Make sure the cables are connected correctly (Rx to Tx and Tx to Rx) on each link. • Make sure you used straight-thru shielded cables to connect the PCI-SB card to remote devices. Do not use cross-over cables to connect the devices. • Reboot remote device; then reboot local device.

TABLE 5. Troubleshooting Procedures

Step	If this happens...	Do this:
3	One row of LEDs is flashing and the other row of LEDs remains on or solid.	<p>Only one serial port link is transmitting and receiving data traffic. The serial port with the flashing LEDs is synchronized, but unable to transmit or receive data.</p> <ul style="list-style-type: none"> • Make sure the RJ-45 shielded cable plugs are securely attached on the ports with the flashing LEDs. • Make sure you used straight-thru shielded cables to connect the PCI-SB card to remote devices. Do not use cross-over cables to connect the devices. • Swap the cable on the unsynchronized link with the cable from the working link to make sure the cable is operational. • Reboot remote device; then reboot local device.
4	The PCI-SB card is not visible in the list of devices in Windows Device Manager	<p>There is a cable problem, the card is not seated properly, or it is configured incorrectly.</p> <ul style="list-style-type: none"> • Make sure the card is fully seated in the expansion slot. • Check the DIP switches to make sure the card is configured correctly for Bridge_Enabled operation. • Make sure the cable's RJ-45 plugs are fully inserted in the RJ-45 jacks. • Check cabling to make sure you are using standard CAT5 straight-thru shielded cables. Do not use cross-over cables. • Reboot remote device; then reboot local device.

TABLE 5. Troubleshooting Procedures

Step	If this happens...	Do this:
5	The PCI-SB card is not visible after executing the lspci command in Linux or sysdef in Solaris.	<p>There is a cable problem, the card is not seated properly, or it is configured incorrectly.</p> <ul style="list-style-type: none"> • Make sure the card is fully seated in the expansion slot. • Check the DIP switches to make sure the card is configured correctly for Bridge_Enabled operation. • Make sure the cable's RJ-45 plugs are fully inserted in the RJ-45 jacks. • Check cabling to make sure you are using standard CAT5 straight-thru shielded cables. • Reboot remote device; then reboot local device.
6	LEDs are Off.	<p>There is a power problem or links are unsynchronized and no traffic is enabled.</p> <ul style="list-style-type: none"> • Make sure the local device is plugged into an electrical outlet and powered On. • Make sure the card is fully seated in the expansion slot. • Reboot remote device; then reboot local device.
7	Bridge is disabled or not functioning.	<p>The DIP switches are incorrectly configured for bridge operation.</p> <ul style="list-style-type: none"> • Make sure the DIP switches are configured correctly for the Bridge or Lead operation as shown in Figure 19 on page 3-6. • Make sure the card is set for Bridge_Enabled, not Gateway operation.



If you are unable to correct a problem after completing the troubleshooting procedures, contact Aurora Technologies at 508 588-6110, or support@auroratech.com.

Warranty & Maintenance Information

Warranty on Hardware & Software

Aurora products carry the following standard warranties:

Standard Hardware Warranty Policy

All Aurora hardware products are warranted against defects for two (2) years from the date of delivery. The Standard Warranty includes 90 days of free Technical Support, two (2) years product repair, and driver upgrades.

Standard Software Warranty Policy

Aurora warrants that the physical media on which software is furnished will be free from defects in materials and workmanship, under normal use, for a period of (90) days from the date of shipment.

The Standard Warranty includes 90 days of Free Technical Support.

Make sure you complete the Warranty Registration form on page 5-2 and return it to Aurora Technologies. Refer to Warranty information at www.auroratech.com for details on extended warranty plans.

Product Registration Form

Important! Please print, complete, and return this Product Registration Form to Aurora's Customer Service and Support (CSS) Department at 508-588-0498. The information you provide here allows CSS to validate your warranty and inform you of software and hardware upgrades.

Purchase Order No.: _____ **Sales Order No.:** _____

Serial No.: _____

Name/Title: _____

Company: _____

Street Address: _____

City: _____ **State:** _____ **Postal Code:** _____

Country: _____

Phone: _____ **Fax:** _____

Email Address: _____

Supplier Name: _____ **Date Purchased:** _____

Supplier Address: _____

City: _____ **State:** _____ **Postal Code:** _____

Country: _____

Supplier Phone: _____

Protocol/Software License Application

Product: ☐ X.25 ☐ HDLC ☐ Control Tower **Version:** _____

Workstation Type: _____ **O/S Version:** _____ **Host ID:** _____

Maximum Number of Ports: _____

Your Application

☐ Printer/Plotter Connectivity

☐ Internet Connectivity

☐ Terminal/Instrumentation I/O

☐ Telecom Service Provider

☐ Modem Pool

☐ Data Feed

☐ WAN Connectivity

☐ Other

Aurora Technologies, Inc. - 10 Mupac Drive Brockton, MA 02301 - USA
Phone: 508-588-6110 - Fax: 508-588-0498 - E-mail: support@auroratech.com -
URL: www.auroratech.com

Cable & Port Requirements

Introduction

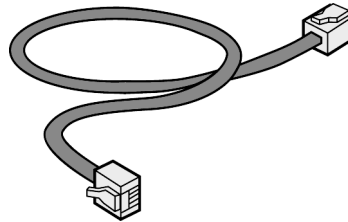
This chapter contains information on cable and pinout specifications for the PCI-SB card, including:

- The correct cable to use to connect a PCI-SB card to remote devices.
- The pinout layout for each RJ-45 port on the PCI-SB card.

Cable & Port Pinouts

Cables

The PCI-SB card uses standard Category 5 (CAT5) or better Shielded Twisted Pair (STP) straight-thru cables with RJ-45 connectors to attach to remote devices, as shown in Figure 38.



RJ-45 Straight-thru Cable

FIGURE 38. RJ-45 Connectors and Pin Layout

RJ-45 Pin Layout

The Dual RJ-45 connectors use all eight pins in each jack for transmitting and receiving signals. In each link, one jack receives signals and the other jack transmits signals, as shown in Figure 39.

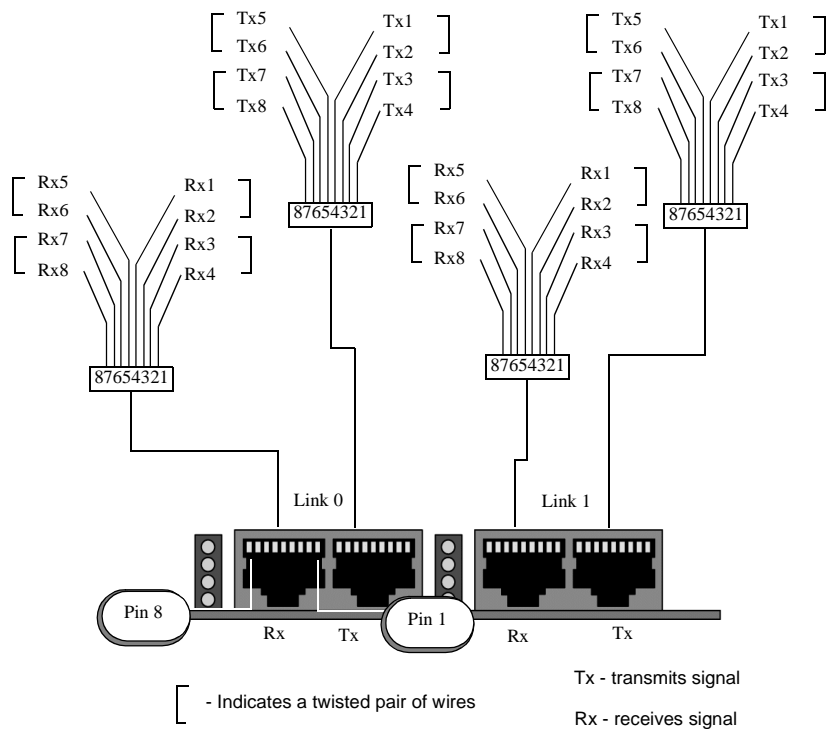


FIGURE 39. RJ-45 Jacks Transmit and Receive Signalling



If you can't determine whether or not your RJ-45 cable is a straight-thru cable or a cross-over cable, use an electronic cable tester to determine cable type.

Specifications

Introduction

This chapter contains information on specifications for the PCI-SB card, including:

- Hardware specifications.
- Physical specifications.
- Environmental specifications.

Hardware, Physical, & Environmental

Table 6, Table 7, and Table 8 provide information on specifications you should know about when installing and operating the PCI-SB card in your environment.

Hardware

Table 6 describes hardware specifications for the PCI-SB card and peripherals.

TABLE 6. Hardware

Specification	Description
Model	PCI-SB card
PCI Compliance	PCI 2.2
Bus Type	PCI Bridge 1.1 Specification
Motherboard	PCI 2.2 compliant or above
Connectors	Dual StarFabric serial links with four RJ-45 connectors for front I/O or four bus connectors for read I/O.
Bus Speed	33/66 MHz
Bus Width	32/64 Bits
Signal Standards	Low Voltage Digital Signalling (LVDS) IEEE 1596.3 and TIA/EIA-644 Low Voltage
Maximum Distances	Five meters from the PCI-SB card to other StarFabric-enabled devices.
Interconnect Bandwidth	2.5 Gbps or 5.0 Gbps full duplex
Certification	Approved for: <ul style="list-style-type: none"> • FCC Class A, CE, UL 1950 • EN55022 • EN55024

Physical

Table 7 describes physical specifications for PCI-SB card.

TABLE 7. Physical

Specification	Description
Bus Interface	PCI 2.2
Dimensions	75mm x 150mm x 8.2mm
Weight	6 oz.
Interface cable	Two or four Category 5 shielded cables with RJ-45 connectors
Power Supply	3.3 vDC required, 5V tolerant
Power Consumption	2 Watts maximum

Environmental

Table 8 describes environmental specifications for the PCI-SB card.

TABLE 8. Environmental

Specification	Range
Operating Temperatures	+10 to +50C
Storage Temperature	-20 to +60C
Relative Humidity	5% to 95%, non-condensing
MTBF (Mean Time Between Failure)	50,000 hours



The SG2010 requires +3.3V for core power at the chip level. Some older computer systems cannot supply +3.3V. Make sure your computer supports this voltage requirement before installing the PCI-SB card.

About the PVX Utility

Introduction

This appendix describes how to use Stargen's PCI Validation eXtension (PVX) Utility to support StarFabric-enabled devices in your topology.

Topics include:

- PVX Utility components.
- How to use PVX to view StarFabric-enabled devices in your topology.
- How to use PVX to troubleshoot StarFabric-enabled devices in your topology.



The PVX Utility is a Stargen product supplied by Aurora Technologies on the CD-ROM that shipped with your Aurora Technologies Host Interface Card. If you need additional information or support for the PVX Utility after reading this appendix, refer to the StarGen user documentation at www.stargen.com or contact StarGen.

About the PVX Utility

PVX is a handy MS-DOS[®] utility from StarGen that lets you view the configuration memory of StarFabric-enabled devices in your topology and perform some basic testing and troubleshooting on them.

The PVX Utility is compatible with Windows 98 and Windows 2000. However, some PVX functionality such as point-and-click selection and navigation with a mouse and scanning for devices are not supported by Windows 2000 (Use key-strokes to open tools and select options in Windows 2000).

PVX has the following components:

- PVX user interface window with menu bar
- Command Line Debugger Interface and Scan tool
- Fabric Primitives Library (FPL)

MS-DOS User Interface

The PVX Utility provides a basic MS-DOS windowed Text User Interface (TUI) that has a menu bar with options used to view configuration information for all the StarFabric-enabled devices configured in your topology. You can launch debug and diagnostic tools from the menu bar or by pressing keystrokes from inside the PVX interface window.

Debug from a Command Line

The Command Line Debugger lets you test and troubleshoot StarFabric-enabled devices in the topology. You can launch the debugger from the menu bar or press **Alt-D** from inside the PVX interface window.

Scan for StarFabric Devices

The PVX Utility also has a tool that lets you quickly scan for all the devices attached to the StarFabric and view configuration information about the devices by pointing and clicking at them. You can launch the scan option from the menu bar or by pressing **Alt-S** from inside the PVX interface window.

Fabric Primitives Library

StarGen's Fabric Primitives Library (FPL) lets you take full advantage of the SG2010 chipset's advanced features by helping you develop software to fully utilize your StarFabric-enabled interface card for path routing and gateway functionality.

Using the FPL requires customized programming and advanced knowledge of the PVX Utility. Contact Stargen for recommendations and guidelines on using the FPL.

Using the PVX Utility

This section describes how to run PVX and use some of the PVX tools to monitor and diagnose problems with StarFabric devices your topology.



Aurora Technologies recommends you do not use PVX Utility tools or options without first developing a good understanding of the implications of executing these options in your PCI topology. For example, don't use the **SPROM** option from the Tools menu until you develop a complete understanding of the option. Usage of this option may damage or erase the EPROM on your Aurora Technologies' Host Interface Card.

Running the PVX Utility

Follow these steps to run the PVX utility:

1. Insert the product CD-ROM containing the PVX utility into the CD-ROM drive on your computer.
2. Double-click on the **PVX.exe** file on the CD-ROM, as shown in Figure 40.

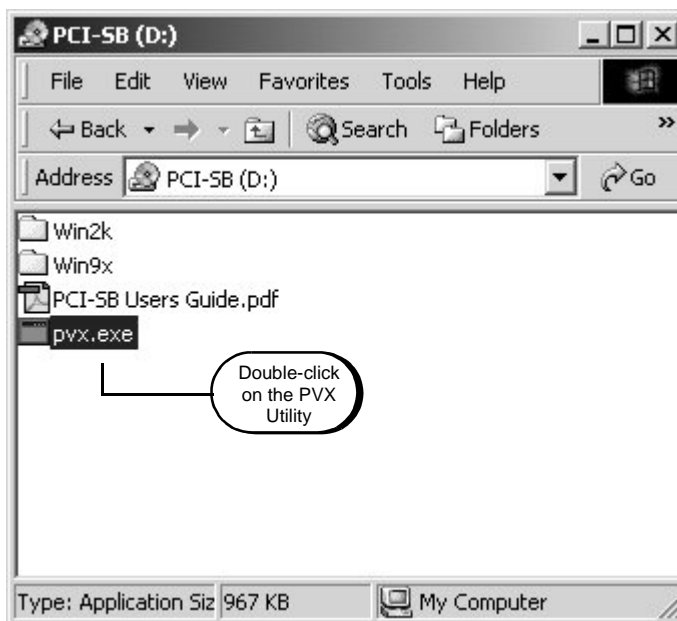


FIGURE 40. Pointing and Clicking on the PVX Utility

Or:

Open a MS-DOS window by selecting **Start -> Programs -> Accessories -> Command Prompt** from Windows 2000 or **Start -> Programs -> MS-DOS. Prompt** from Windows 98.

At the MS DOS prompt, type the drive location of the CD-ROM followed by **pvx** and press **Return** to run the PVX Utility, as shown in Figure 41.

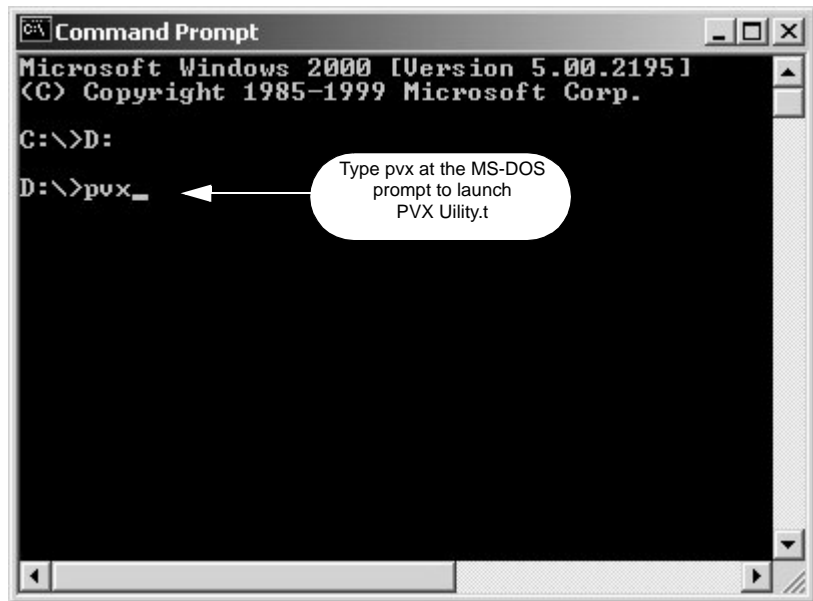


FIGURE 41. Launching PVX from the MS-DOS Window

The PVX Utility splash screen and prompt appear, as shown in Figure 42.



FIGURE 42. PVX Utility Prompt

3. Click **OK** at the prompt to open the utility.

The PVX Utility interface window appears as shown in Figure 43. From this window, you can launch the debugger or select another tool from the menu bar.

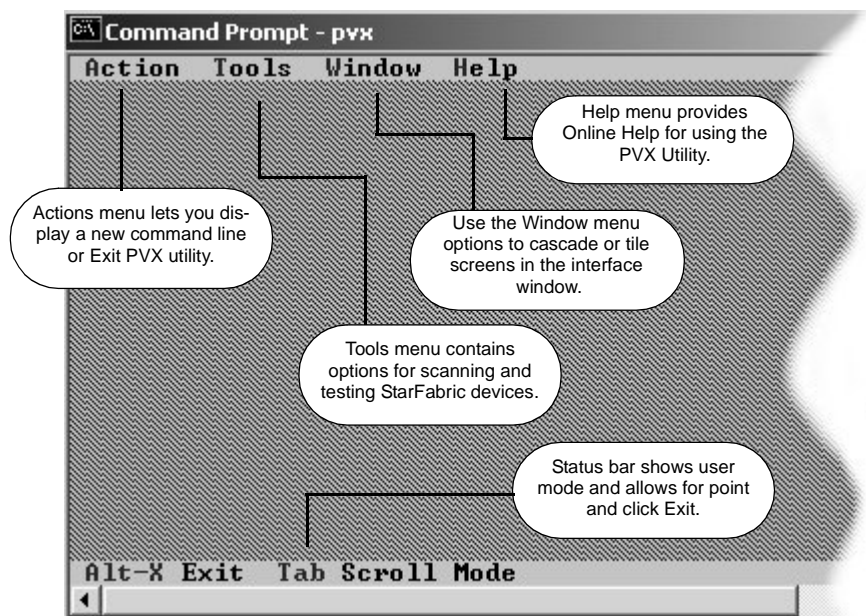


FIGURE 43. PVX Utility Interface Window

Toggling Between User Modes

There are two user modes available when you use PVX tools:

- Command
- Scroll

Use the Tab key to toggle back and forth between user modes when using Debug or Scan tools.

Command mode

This mode displays a command line prompt used to execute commands to view or test StarFabric devices in the topology, as shown in Figure 44. You type in new

commands at the command line or use the Up and Down arrow keys to recall previous commands.



FIGURE 44. Command Mode in PVX Utility

Scroll mode

This mode displays scroll bars in the current window so you can easily navigate through screens of information using a scroll bar, as shown in Figure 45.

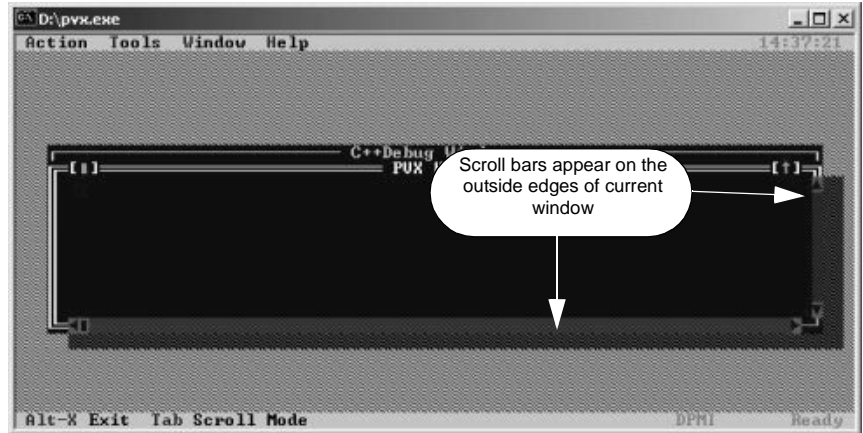


FIGURE 45. Scroll Mode in PVX Utility

Using the Command Line Debugger

The command line debugger provides a number of useful commands for testing and troubleshooting StarFabric devices and components in your topology. See “Debug Commands & Descriptions” on page C-13 for a list of commonly used commands and descriptions.

To Run the Debugger:

1. Select **Tools -> Debug** from the menu bar as shown in Figure 46.
Or:
Type **Alt-D** from the user interface window.

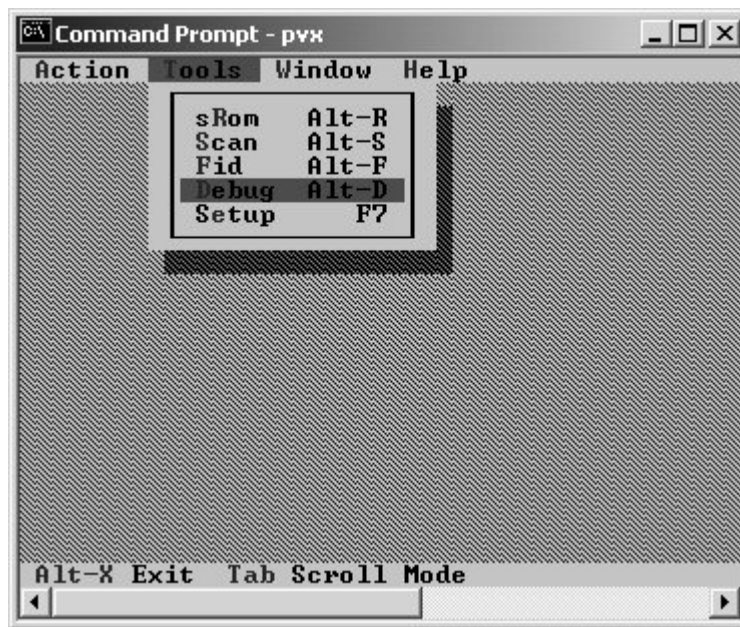


FIGURE 46. Running Debugger Tools

2. Type in the command you want to perform at the system prompt during this session.
For example, type **dis**(cover) to discover and initialize all the StarFabric devices in your topology, as shown in Figure 47.

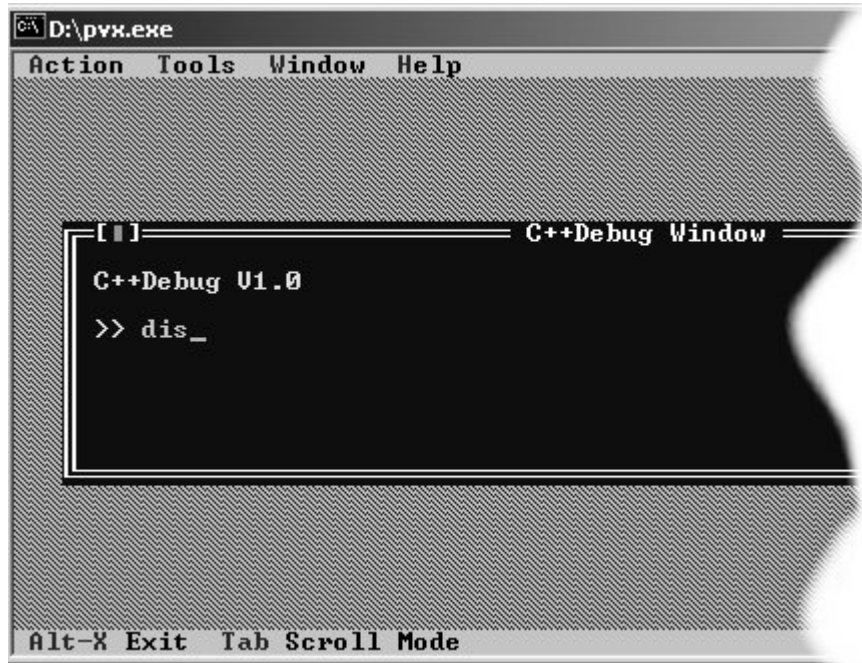


FIGURE 47. Discovering Devices in the StarFabric

A scrolling list of all the StarFabric-enabled devices in your topology appears, along with other important topology information, as shown in Figure 48 on page C-12.

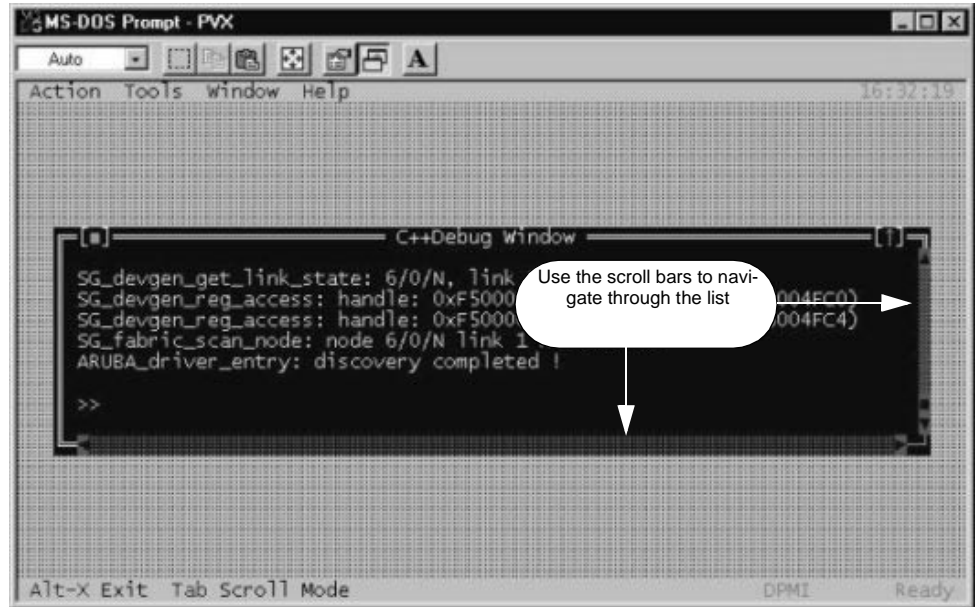


FIGURE 48. Scrolling List of Discovered StarFabric-enabled Devices

3. Use the scroll bar on the right side of the window to navigate through the information.

Debug Commands & Descriptions

Table 9 describes common debug commands supported for the PVX Utility. Refer to StarGen user documentation for a complete list of supported commands.

TABLE 9. Common Debugger Commands for StarFabric Devices

Command	Parameters	Description
dis(cover)	None	Discovers and initializes all reachable devices and components attached to the StarFabric.
mem	<ul style="list-style-type: none"> • -r[blsld] start_address [end_address] • -w[blsld] start_address[end_address] value • -ls address_of_link_state_entry_to_display • -dump start_address[end_address] • -fill start_address [end_address] value 	Reads and writes memory space, displays link state table entry, and dumps memory contents.
io	<ul style="list-style-type: none"> • -f[blsld] start_address[end_address] • -w[blsld] start_address[end_address] value • -dump start_address[end_address] • -fill start_address [end_address] value 	Reads I/O space, writes to I/O space, dumps I/O contents, and fills I/O contents.
graph	-show	Shows all devices and components attached to the primary PCI bus in list form.
test	None	Executes a diagnostic test on the local StarFabric card.
help	None	Launches online Help file.
log	[filename.ext]	Turns on logging to a file.
unlog	None	Turns off logging.

Scanning for StarFabric Devices

The Scan option available from the Tools menu lets you quickly view a list of all the StarFabric-enabled peripheral devices installed and attached to the StarFabric-enabled device on the primary PCI bus in your topology.

To scan all devices in your topology:

1. Select **Tools -> Scan** from the menu bar, as shown in Figure 49.
Or:
Type **Alt-S** from the user interface window.

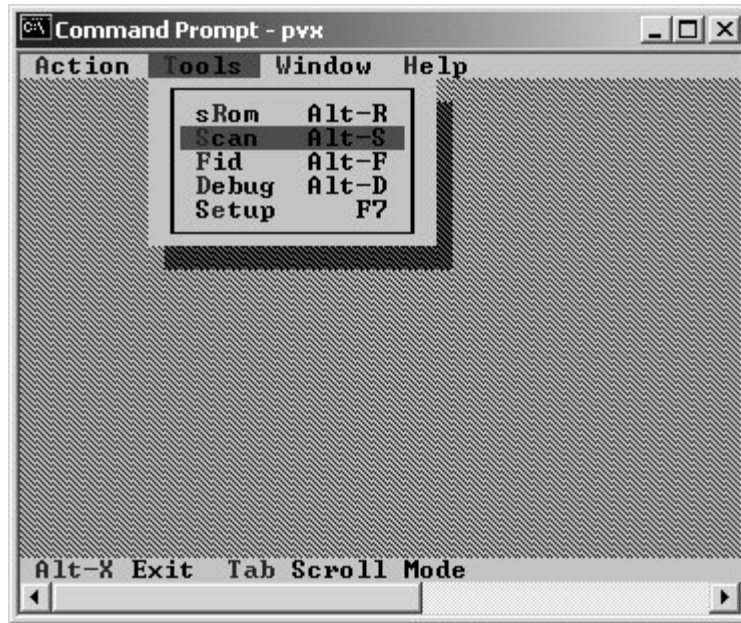
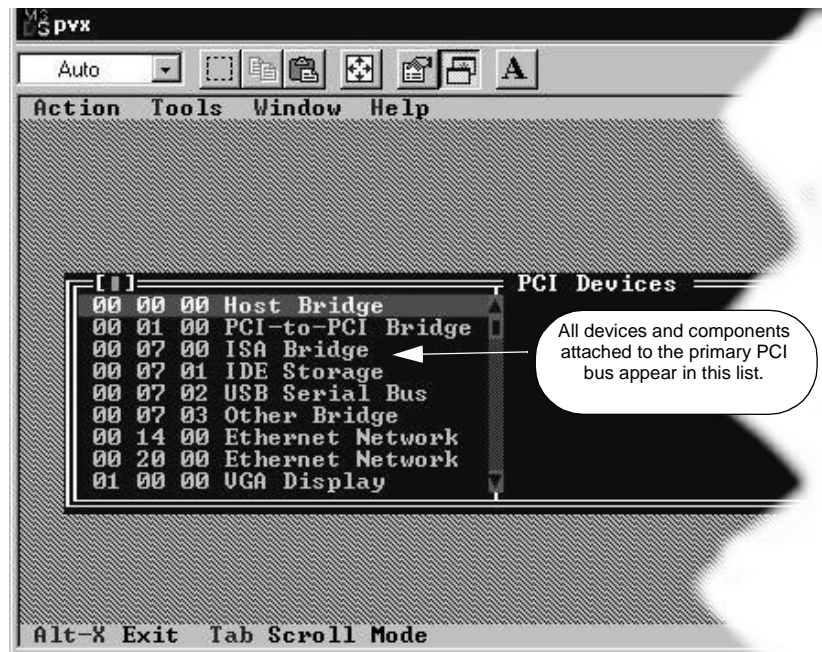


FIGURE 49. Selecting the Scan Tool

A scrolling list appears showing all the components attached to the primary PCI bus over the StarFabric, as shown in Figure 50 on page C-15.

**FIGURE 50. Scan Tool Scrolling Window**

2. Point and click on a device or component in the list or press the Space bar while a device or component is highlighted to display details on that device or component, as shown in Figure 51 on page C-16.

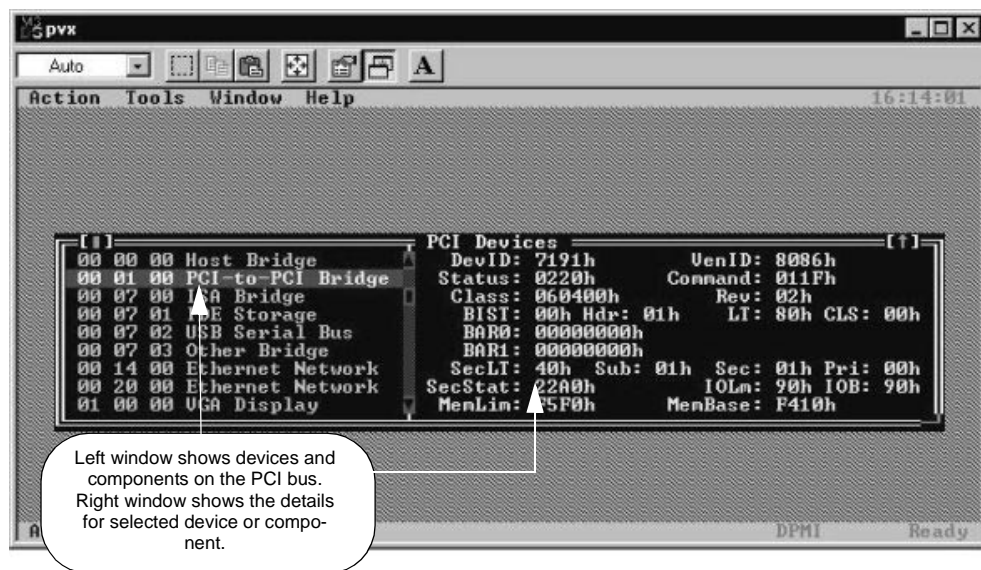


FIGURE 51. Scanning Device Information in Detail

Tiling and Cascading User Interface Windows

The PVX Utility lets you tile or cascade screens in the user interface window.

If you have more than one debug session running or you are scanning and debugging at the same time, you can tile the interface windows as shown in Figure 52.

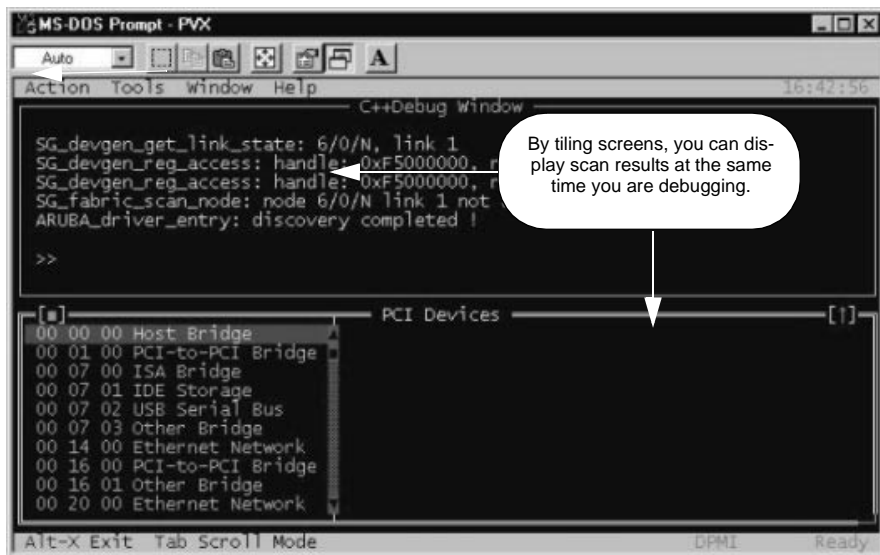


FIGURE 52. Tiling Interface Windows

Select **Windows -> Tile** from the menu bar to tile different screens so you can view more than one screen at a time.

Select **Windows -> Cascade** from the menu bar to overlay screens one after the other.

Terms and Definitions

This chapter describes terminology you should be familiar with to install and operate Aurora Technologies products in your environment.

Address Routing

Refers to the addressing scheme used during legacy PCI operation of a StarFabric switch fabric where all StarFabric-enabled devices in the topology are identified by a Fabric Identification Number (FID) and a static path to and from the Root bridge is established for each device in the Switch Fabric.

Asynchronous

A communications system in which data transmits intermittently rather than in a steady stream. Asynchronous protocols require a start bit and a stop bit to indicate the beginning and the end of a data transmission. A telephone conversation is an example of asynchronous transmission because both parties talk whenever they like. If the communication were synchronous, each party would be required to wait a specified interval before speaking. Most communications between computers and devices are asynchronous.

ANSI: (American National Standards Institute)

A U.S. organization that establishes computer standards, such as ASCII (the most common way computers represent characters).

Bandwidth

The amount of data that can be transmitted in a fixed amount of time. For digital devices, the bandwidth is expressed in bits per second (bps) or bytes per second. For analog devices, the bandwidth is expressed in cycles per second, or Hertz (Hz).

Bit

Abbreviation for binary digit. A binary digit has one of two values: 1 or 0. This contrasts with a decimal digit, which has a value from 0 to 9. A bit is represented as either a 1 or 0 in the binary settings that make up a byte of data. See also Byte.

Board

A single electronic card with one or more computer chips on it, such as a motherboard or a serial board.

Bridge

An edge node that provides protocol translation. For example, the PCI-SB and the PMC-SB cards act as bridges between a PCI bus and the switch fabric running the StarProtocol.

Buffer

An area of RAM reserved for temporary storage of data waiting to be sent to a device. The data is usually on its way to or from the hard disk drive or some other peripheral device.

Bundled Link

Refers to card interface that has multiple links to another device to increase the bandwidth or provide higher reliability between devices.

Bus

The shared pathway in a computer used to connect multiple peripherals or devices. Imagine it as a freeway with multiple lanes connecting various parts of the system. There are different types of buses, including VME, EISA, and PCI.

Bus bandwidth

The clock frequency of a bus interface. To calculate peak bus throughput, multiply the bus frequency by the bus width. For example, if a 100MHz bus is 64 bits wide, it transfers 8 bytes per clock cycle 100 million times per second for a maximum throughput of 800MB per second.

Bus-mastering drivers

Software that enables a controller connected to the bus to communicate directly with other devices on the bus without going through the CPU. Most modern bus architectures, including PCI, support bus mastering because it improves performance.

Byte

A byte is 8 bits of information regarded as one word. A byte can represent up to 256 different states for numbers, processor instructions, or a combination of letters and numbers as in the ASCII code.

Cache

Specialized RAM used to optimize data transfers between system elements with different performance characteristics, for example disk to main memory or main memory to CPU.

Card

Synonym for board. A printed-circuit-board that you can insert into a computer to give it added capabilities. For example, the PCI-SB card enables legacy PCI devices to communicate with StarFabric-enabled devices.

Carrier Card

Refers to a non-intelligent, slave module that interfaces 3U or 6U analog, digital, or serial I.O cards to a CompactPCI computer system to preserve space slots and lower system costs

Category-5

Category-5 or CAT5 describes network cabling standard for data throughput that consists of four twisted pairs of copper wire terminated by RJ-45 connectors. CAT5 is based on the EIA/TIA 568 Commercial Building Telecommunications Wiring Standard developed by the Electronics Industries Association requested by the Computer Communications Industry Association in 1985.

Chipset

A term that describes the architecture of an integrated circuit used to provide the processing power for a computer board.

CRC

Acronym for Cyclic Redundancy Check. This is an error detection code that is recorded within each sector or leg of a data transmission and is used to see whether parts of a string of data are missing or erroneous.

Daisy-Chain

A hardware configuration in which devices are connected together, one after the other in a series. For example, StarFabric-enabled devices can be daisy-chained together by connecting the STP cables from one device to another to create a chain of devices.

Discovery

Refers to the StarProtocol's process of identifying StarFabric-enabled devices connected to the Switch Fabric.

Downstream

Used with the transmission flow of data in the switch fabric to indicate a direction flow away from the Root bridge.

Dual High-Speed Serial Links

Refers to pair of RJ-45 serial connectors on an Aurora Host Interface Card (such as the PCI-SB or PMC-SB cards) that support data transmission speeds up to 622 Mbps.

Driver

The software that communicates between a hardware peripheral and the rest of the computer system.

EN55022

Refers to European standard for limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment.

EN55024

Refers to European standard for Generic Immunity Standard.

Enumeration

An initialization process after reset that automatically assigns each component in the fabric with a unique identifier and provides information about the fabric's topology.

Fabric Primitives Library

The Fabric Primitives Library contains routines for the configuration and maintenance of StarFabric components.

Fault Detection

Refers to systematic approach used by a network interface to detect or protect data transmission against errors when transmitting or receiving signals across the network.

FCC Class A

Refers to an electrical device classification that signifies the device is compliant with Part 15 of FCC rules indicating device does not cause harmful interference and device accepts harmful interference and operates as intended.

Form factor

The industry standard that defines the physical, external dimensions of a particular device or board.

Front I/O

Refers to ports or interface connectors that reside on the front of an I/O card such as the PMC-SBF card. Typically, front I/O cards use cables to connect to other devices.

Gateway

Refers to a StarFabric-enabled device in a switch fabric that serves as an access point to the StarFabric-enabled devices behind it.

Gigabyte (GB)

A unit of measure consisting of one billion bytes (one thousand megabytes).

Host

Refers to a host computer running a PCI-SB or PMC-SB card as a Root bridge. It communicates with a StarFabric-enabled device over a network or expansion topology.

IEEE

Refers to the Institute of Electrical and Electronic Engineers. This is an organization that develops standards for networking (including Ethernet and Token Ring protocols). For example, IEEE 1596.3 is a standard used in for Low Voltage Differential Signalling (LVDS).

I/O (Input/Output) System

Refers to the part of a computer system that handles inputting or outputting data such as from a terminal, hard disk or tape. Data moving to or from memory is not considered I/O.

IP (Internet Protocol)

The IP part of the TCP/IP communications protocol. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or subnetwork. IP accepts packets from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a datagram to the layer 2 data link protocol. It may also break the packet into fragments to support the maximum transmission unit (MTU) of the network.

ISA (Industry Standard Architecture)

An alternative expansion bus commonly used in PCs. It accepts the plug-in boards that control the video display, disks and other peripherals. Most PCs today use either ISA or PCI buses or have a combination of ISA and PCI slots.

Isochronous

Refers to a data communications system where data must be delivered within certain time constraints. For example, multimedia streams require an isochronous transport mechanism to ensure that data is delivered as fast as it is displayed and to ensure that the audio is synchronized with the video.

Kilobyte (KB)

A unit of measure consisting of 1,024 bytes.

LAN (Local Area Network)

A network used within a confined physical area such as the floor of a building, in contrast to a WAN (Wide Area Network). Ethernet is a LAN.

Leaf Node

Refers to any edge node that is not configured as a Root bridge in a StarFabric application. Typically, Leaf refers to downstream StarFabric-enabled edge nodes in a path routing application. the Leaf node requires reset and enumeration from the Root node to join the StarFabric.

Legacy Mode

A function of the PCI-to-StarFabric bridge that supports legacy address-routed traffic, providing 100% backwards compatibility with existing PCI hardware, software, drivers, and operating systems.

Legacy PCI

Refers to the existing local peripheral component bus architecture standard developed by Intel Corporation. PCI is a 32- or 64-bit bus that runs at clock speeds of 33 or 66 MHz and typically yields a throughput rate of 133 Mbps. StarFabric technology enables legacy PCI devices to take advantage of next-generation switch-serial interconnectivity without costly upgrades or software development. Although developed by Intel, PCI is not tied to any particular family of microprocessors.

Link

The physical connection between two nodes that enables the nodes to communicate. The link includes the physical hardware that provides the interface between the nodes and the Low Voltage Digital Signalling that connects them.

LVDS

Low Voltage Differential Signaling (IEEE 1596.3) is a low noise, low power, low amplitude method for high-speed (gigabits per second) data transmission over copper wire. Low voltage means the standard 5 volts used for normal digital I/O is replaced by either 3.3 volts or 1.5 volts. With standard I/O signaling, data storage is contingent upon the actual voltage level and voltage level can be affected by wire length (longer wires increase resistance, which lowers voltage). But with LVDS, data storage is distinguished only by positive and negative voltage values, not the voltage level, so data can travel over greater lengths of wire while maintaining a clear and consistent data stream.

Megabyte (MB)

A unit of measurement equal to roughly 1 million bytes or 1,024 kilobytes.

Megahertz (MHz)

A measurement of frequency in millions of cycles per second.

MTBF

An acronym for mean time between failure. This is a reliability rating indicating the expected failure rate of a product based on number of hours in operation.

Node

Generic name for any edge node or switch that supports the StarProtocol.

Operating Mode(s)

The Aurora Technologies PCI-SB and PMC-SB cards have two operating modes when configured for bridge operation: Root and Leaf. The device containing the primary PCI bus is typically configured for Root bridge operation. Remote devices containing secondary PCI buses or expansion slots are configured for Leaf operation.

Operating system (OS)

The low level software that controls a computer's hardware and determines what actions are possible from programs. UNIX, Linux, Windows and DOS are examples of operating systems.

Parallel

A technique of passing bits of data at the same time. For example, a parallel interface such as RJ-45 can pass 8 bits of data on a cable at the same time (through 8 separate lines in the cable).

Path Routing

A mechanism used to transmit or route data frames through the switch fabric based on the relative path the data must take to travel from the source node to the destination or target node. Typically, path routing is able to dynamically select the best path to take between two nodes based on a user-defined algorithm.

PCI

Refers to Peripheral Component Interconnect. It is an open bus standard that allows for high speed communication (up to 66 MHz and 64 bits) between peripherals and the system host CPU.

PMC-SB Card

Refers to the Compact Peripheral Component Interconnect form factor card from Aurora Technologies that enables legacy PCI systems to interface with next-generation StarFabric technology.

PCI 1.1

Refers to the PCI SIG PCI specification that addresses the need for increased bandwidth of PCI devices. PCI-1.1 enables the design of systems and devices that operate at clock speeds up to 133 MHz, or 1 GBs. It also provides for protocol enhancements that enable devices to operate much more efficiently by providing more usable bandwidth at any clock frequency.

Peripherals

A hardware device added to a computer system to provide functionality beyond the basic CPU, such as a modem, video card, disk drive, tape drive, or printer.

PICMG

PCI Industrial Computer Management Group.

PICMG 2.17

Refers to the StarFabric CompactPCI specification that defines backplane, node card and switch card requirements that are compatible with both the StarFabric Protocol Specification and appropriate existing PICMG Specifications.

Primary Bus

The physical PCI bus in a personal computer or workstation operating as a host system in PCI topology. Typically, the host system operates as a Root bridge on a StarFabric-enabled topology. All other StarFabric-enabled devices in the topology attach to secondary PCI buses.

PVX Utility

PVX is an MSDOS™ utility from StarGen that lets you view the configuration memory of StarFabric-enabled PCI devices in your PCI topology and perform some basic testing and troubleshooting on them.

Rear I/O

Refers to interface connectors that reside on the rear of an I/O card such as the PMC-SBR card and attach to the bus connectors of an enclosure or chassis.

Redundancy

Refers to systematic approach of building alternate or additional physical connections or hardware in your network topology. For example, a PMC-SB card can be configured to provide redundant serial links between a target node and the source node by connecting all four ports on the card to another device using RJ-45 cables.

RJ-45 Connector

An eight-wire modular telephone jack. It is similar to the RJ-11 plug used for modem interfaces, but the RJ-45 connector acts as an interconnect cable between computers, such as connecting a host system and a remote device.

Root Mode

This is an operational mode that establishes the StarFabric-enabled device as the uppermost bridge in a StarFabric Switch Fabric. The Root bridge is attached to the primary physical PCI bus. It establishes the transparent bridge interface between the physical PCI bus and the switch fabric and all downstream bridges or nodes. The Root node initiates fabric resets and enumerates all the StarFabric-enabled devices in the topology.

StarFabric

A next-generation switched interconnect technology that provides a universal, scalable, and highly-reliable switch fabric for data, voice, and video communications networks.

StarFabric-Enabled Device

Any device supporting hardware interfaces capable of supporting the StarFabric protocol in a Switch Fabric.

StarProtocol (SP)

The switched-serial protocol used to transmit data across the Switch Fabric.

Secondary Bus

Refers to PCI buses that attach to the switch fabric through a Leaf bridge connected to the switch fabric or a Root bridge attached to the primary, physical PCI bus.

Serial

A manner of passing data sequentially. To transfer 8 bits of data on a serial cable requires sending each bit one after the other. For example, RS232 is a common serial interface. See also Parallel.

Serial Link(s)

Refers to interface ports or connectors that transmit data one bit at a time. The opposite of a serial link is a parallel port or link that transfers several bits concurrently.

Serial Port(s)

An I/O port that supports only serial data transmission. It must convert data from the parallel port format of the system bus to a serial data stream, and back again.

SCSI

Acronym for Small Computer System Interface. SCSI is an American National Standards Institute (ANSI) interface between the computer and peripheral controllers. Many UNIX operating system workstations and Apple Macintosh systems use the SCSI interface.

Source

The originator node of a data transmission in the Switch Fabric. The source node sends a data transmission to a destination or target node.

Static Addressing

A name or a number that identifies a network device and remains unchanged even if the physical configuration of the network changes. For example, in a StarFabric Switch Fabric, every node or device has a Fabric Identification (FID) number. In a legacy PCI environment where static addressing is used, these FID numbers are assigned at power-up and remain unchanged even if certain devices become unavailable because of broken links.

Switch

A node that receives a frame from one node and forwards it to another node in the switch fabric based on address information

Switch Fabric

Refers to the switched-serial interconnect using the StarProtocol to transmit data frames. This includes switches and edge nodes, and the links that connect them together in the Switch Fabric.

Synchronous

Most communication between computers is asynchronous, meaning it can occur at any time and at irregular intervals. Communication within a computer, however, is usually synchronous and is governed by the microprocessor clock. Signals along the bus can occur only at specific points in the clock cycle.

Target

A node in the switch fabric that is the destination or target of a data transmission from a source node.

TCP/IP

Transport Control Protocol/Internet Protocol refers to the Internet Protocol (IP) in general. Internet Protocol has different ways of handling and packaging data for transport over a network, such as TCP and UDP (User Datagram Protocol).

Turns

Refers to the number of nodes data must traverse between a source device and a target device during a network transmission. Each node in the path between the source device and the target device is referred to as a turn. If there are three nodes between the target device and the source device, the path would have three *turns*.

Universal Card(s)

User card that runs at 3.0v or 5.0v depending on the voltage requirements of the system it is installed in.

Upstream

Used with the transmission flow of data in the switch fabric to indicate a direction flow toward the Root bridge.

XP-SG StarFabric PCI Expansion Chassis

Aurora Technologies' two-slot or three-slot, PCI 2.2 compliant, expansion chassis for StarFabric topologies.

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